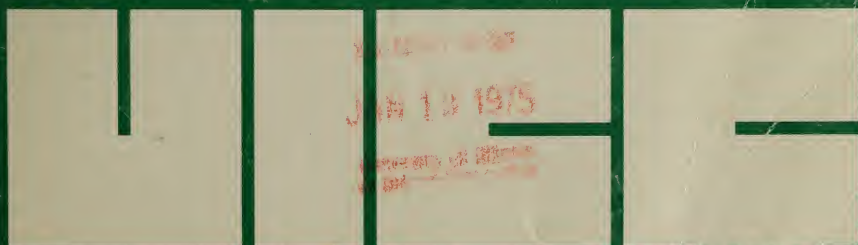Reference
desk

ICAGO CIRCLE BULLETIN

GRADUATE STUDY 1974-75
UNIVERSITY OF ILLINOIS AT CHICAGO CIRCLE

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Graduate Study

University of Illinois

at

Chicago Circle

1974-1975

A Message from the Dean

This bulletin has two purposes: to provide useful information about and to describe generally the rules governing graduate study at the University of Illinois at Chicago Circle. It is based on the best information available when it was prepared, at the beginning of April 1974. Every effort has been made to ensure that the bulletin is accurate, up-to-date, and informative. However, you are reminded that programs, courses, and faculty may change before the opening of the 1974-75 academic year. You should consult the department director of graduate studies and the quarterly timetables for the latest information.

I would appreciate your recommendations of how this publication could be made more useful to you, to your friends and colleagues, and to future graduate students.—*Jan Rocek.*

Contents

Calendar of the Graduate College

May 9, F	Last day to drop a course
May 16, F	Last day for Graduate College approval of format of spring quarter master's theses
May 26, M	Memorial Day (no classes)
June 6, F	Instruction ends
	Last day for addition of names to spring quarter graduation list
June 9-13, M-F	Final examinations
June 13, F	Last day of quarter
June 15, Su	Commencement

Summer Quarter 1975

June 18-19, W-Th	Registration
June 23, M	Instruction begins
June 27, F	Last day to submit titles of PhD theses
July 4, F	Independence Day (no classes)
July 25, F	Last day for Graduate College approval of format of summer quarter PhD theses
	Last day to submit titles of master's theses
August 1, F	Last day to drop a course
August 8, F	Last day for Graduate College approval of format of summer quarter master's theses
August 29, F	Instruction ends
	Last day for addition of names to summer quarter graduation list
September 1, M	Labor Day (no classes)
September 2-5, Tu-F	Final examinations
September 5, F	Last day of quarter

1975-76

Fall Quarter 1975

September 16-18, Tu-Th	Registration
September 22, M	Instruction begins
September 26, F	Last day to submit titles of PhD theses
October 24, F	Last day for Graduate College approval of format of fall quarter PhD theses
	Last day to submit titles of master's theses
October 31, F	Last day to drop a course
November 7, F	Last day for Graduate College approval of format of fall quarter master's theses
November 11, Tu	Veterans Day (no classes)
November 26, W	Instruction ends
	Last day for addition of names to fall quarter graduation list
November 27-28, Th-F	Thanksgiving vacation
December 1-5, M-F	Final examinations
December 5, F	Last day of quarter

Winter Quarter 1976

December 10-11, W-Th	Registration
January 5, M	Instruction begins
January 9, F	Last day to submit titles of PhD theses
February 6, F	Last day for Graduate College approval of format of winter quarter PhD theses
	Last day to submit titles of master's theses
February 13, F	Last day to drop a course
February 16, M	Presidents Day (no classes)
February 20, F	Last day for Graduate College approval of format of winter quarter master's theses
March 12, F	Instruction ends
	Last day for addition of names to winter quarter graduation list
March 15-19, M-F	Final examinations
March 19, F	Last day of quarter

Spring Quarter 1976

March 24-25, W-Th	Registration
March 29, M	Instruction begins
April 2, F	Last day to submit titles of PhD theses
April 16, F	Good Friday (no classes)
April 30, F	Last day for Graduate College approval of format of spring quarter PhD theses
	Last day to submit titles of master's theses
May 7, F	Last day to drop a course

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May 14, F	Last day for Graduate College approval of format of spring quarter master's theses
May 31, M	Memorial Day (no classes)
June 4, F	Instruction ends
	Last day for addition of names to spring quarter graduation list
June 7-11, M-F	Final examinations
June 11, F	Last day of quarter
June 13, Su	Commencement

Summer Quarter 1976

June 16-17, W-Th	Registration
June 21, M	Instruction begins
June 25, F	Last day to submit titles of PhD theses
July 5, M	Independence Day (no classes)
July 23, F	Last day for Graduate College approval of format of summer quarter PhD theses
	Last day to submit titles of master's theses
July 30, F	Last day to drop a course
August 6, F	Last day for Graduate College approval of format of summer quarter master's theses
August 27, F	Instruction ends
	Last day for addition of names to summer quarter graduation list
August 30-September 3, M-F	Final examinations
September 3, F	Last day of quarter

Administrative Officers

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Chancellor . . . . Warren B. Cheston
Vice Chancellor . . . . Eugene Eidenberg
Vice Chancellor for Academic Affairs . . . . Arnold B. Grobman
Associate Vice Chancellor for Academic Affairs . . . . . . Robert L. Hess
Associate Vice Chancellor for Academic Affairs . . . . . . Joseph I. Lipson
Vice Chancellor for Operations . . . . Robert P. Bentz
Associate Chancellor . . . . Nan E. McGehee
Dean of Student Affairs . . . . Oscar Miller
Dean, College of Architecture and Art . . . . Bertram M. Berenson
Dean, College of Business Administration . . . . Irvin L. Heckmann
Dean, College of Education . . . . Van Cleve Morris
Dean (Acting), College of Engineering . . . . Herbert J. Stein
Dean, Graduate College . . . . Jan Rocek
Dean (Acting), College of Liberal Arts and Sciences . . Richard M. Johnson
Dean, College of Urban Sciences . . . . Charles J. Orlebeke
Director, School of Physical Education . . . . Sheldon L. Fordham
Associate Director, Jane Addams
   School of Social Work . . . . George W. Magner
Librarian . . . . William B. Ernst, Jr.
Director, Admissions and Records . . . . William C. Price

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Vice Chancellor for Campus Affairs,
   Dean of Students . . . . Hugh M. Satterlee
Director of Admissions and Records . . . . Jane W. Loeb
Dean (Acting), Graduate College . . . . George A. Russell

Graduate Units at Chicago Circle

Anthropology: MA
Robert L. Hall, Chairman
3102 Behavioral Sciences Building
Charles A. Reed, Director of Graduate
Studies
3108 Behavioral Sciences Building

Bioengineering: MS, PhD†
Irving F. Miller, Head of the Department
and Director of Graduate Studies
1027 Science and Engineering Offices

Biological Sciences: MS, PhD*
Elmer B. Hadley, Head
3236 Science and Engineering South
David Bardack, Director of Graduate
Studies
4299 Science and Engineering Laboratorie

Chemistry: MS, DA, PhD
Specializations in organic, inorganic, and
physical chemistry.
William F. Sager, Head
408 Science and Engineering South
Cynthia J. Jameson, Director of Graduate
Studies
4238 Science and Engineering South

Criminal Justice: MA, MS
Specializations in criminal justice (MA)
and criminalistics (MS).
James W. Osterburg, Head and Director of
Graduate Studies
4014 Behavioral Sciences Building

Economics: MA
Specializations in urban and quantitative
economics.
George Rosen, Head
2401 University Hall
Houston H. Stokes, Director of Graduate
Studies
2511 University Hall

Energy Engineering: MS, PhD
Specializations in continuum and
molecular fluid mechanics, heat and mass
transfer, and macroscopic and microscopic
thermodynamics.

James P. Hartnett, Head
912 Science and Engineering Offices
Harold A. Simon, Director of Graduate
Studies
931 Science and Engineering Offices

English: MA
Specializations in literature and
creative writing.
Jay A. Levine, Head
2333 University Hall
John E. Hardy, Director of Graduate
Studies
2300 University Hall

French: MA*
William M. Schuyler, Head
1431 University Hall
Robert E. Hallowell, Director of Graduate
Studies
2331 University Hall

Geography: MA*
Specializations in urban geography,
regional development, and environmental
studies.
Clifford E. Tiedemann, Head of the
Department and Director of Graduate
Studies
2102 Behavioral Sciences Building

Geological Sciences: MS, PhD**
Specializations in crystallography,
mineralogy, petrology, and geochemistry;
paleontology, oceanography, sedimentology,
and sedimentary geochemistry.
Werner H. Baur, Head
2460 Science and Engineering South

German: MA, PhD*
Specializations in German literature;
German philology and linguistics.
Robert R. Heitner, Head of the Department
and Director of Graduate Studies
1605 University Hall

†Intercampus program offered in cooperation with the Medical Center campus of the
University of Illinois.
*Intercampus degree program offered in cooperation with the Urbana-Champaign
campus of the University of Illinois.
**PhD in Engineering offered in cooperation with the College of Engineering.

History: MA, MAT, PhD
PhD specializations in early Europe and modern Europe, and British, Russian, French, Italian, and American history. MA specializations in ancient world, medieval Europe, early modern Europe, modern Europe, Russia, Great Britain, Latin America, America (United States), and Africa.
Ronald P. Legon, Chairman
727 Science and Engineering Offices
Carolyn A. Edie, Director of Graduate Studies
633 Science and Engineering Offices

Information Engineering: MS, PhD, PhD*
Specializations in computer and information science, electrical engineering, health-care delivery systems, industrial automation.
Bruce H. McCormick, Head
1112 Science and Engineering Offices
Sharadbabu R. Laxpati, Director of Graduate Studies
1134 Science and Engineering Offices

Linguistics: MA
Specializations in theoretical and applied linguistics, including TESOL.
Andrew Schiller, Head of the Department and Director of Graduate Studies
2033 University Hall

Materials Engineering: MS, PhD
Specializations in metallurgy, soil mechanics and foundations, structures (including concrete technology), engineering mechanics.
Ernest F. Masur, Head
816 Science and Engineering Offices
Thomas C.T. Ting, Director of Graduate Studies
825 Science and Engineering Offices

Mathematics: MA, MST, DA, PhD
Joseph Landin, Head of the Department and Director of Graduate Studies
322 Science and Engineering Offices

Philosophy: MA, PhD
Myles Brand, Chairman
1803 University Hall

Dorothy L. Grover, Director of Graduate Studies
1829 University Hall

Physics: MS, PhD
Specializations in atomic and molecular physics, high energy physics, nuclear physics, solid state physics, theoretical physics.
Swaminatha Sundaram, Head
2244 Science and Engineering South
David J. Vezzetti, Director of Graduate Studies
2350 Science and Engineering South

Political Science: MA, PhD*
Specializations in political analysis, public policy, and urban politics.
Frank P. Scioli, Jr., Acting Head
1102 Behavioral Sciences Building
Lyman A. Kellstedt, Director of Graduate Studies
1108 Behavioral Sciences Building

Psychology: MA, PhD
Leonard D. Eron, Chairman
1008 Behavioral Sciences Building
Philip E. Freedman, Director of Graduate Studies
1042 Behavioral Sciences Building

Quantitative Methods: MA
Specialization in quantitative methods for students admitted to the master's program in urban and quantitative economics.
Leonard Kent, Head
2400 University Hall
Lalitha Sanathanan, Director of Graduate Studies
2519 University Hall

Slavic Languages and Literatures: MA
Specializations in Russian cultural heritage, Polish cultural heritage, and Slavic linguistics, with individual options in Ukrainian, Serbo-Croatian, and Czech studies.
Nicholas Moravcevich, Head of the Department and Director of Graduate Studies
1230 University Hall

*Intercampus degree program offered in cooperation with the Urbana-Champaign campus of the University of Illinois.

Social Work: MSW, DSW
George W. Magner, Associate Director
4503 Education and Communications
Building
W. Paul Simon, Director of Graduate
Studies
4537 Education and Communications
Building

Sociology: MA, PhD
Specializations in urban institutions
and social psychology.
David B. Carpenter, Head
4118 Behavioral Sciences Building
John W. Johnstone, Director of Graduate
Studies
4112 Behavioral Sciences Building

Spanish: MA, MA*
Specializations in applied linguistics
and teaching, Latin American studies, and
peninsular studies.

Brian Dutton, Head
1733 University Hall
Audrey L. Kouvel, Director of Graduate
Studies
1721 University Hall

Speech and Theater: MA
Specializations in communication and
public address and theater.
R. Victor Harnack, Head
1024 Education and Communications
Building
Barbara S. Wood, Director of Graduate
Studies
1042 Education and Communications
Building

Urban Planning and Policy: MUPP
Specializations in urban policy,
community development, health planning,
and educational planning.
Andrew L. Bavas, Director
1140 Behavioral Sciences Building

*Intercampus degree program offered in cooperation with the Urbana-Champaign
campus of the University of Illinois.

Graduate College
1523 University Hall
University of Illinois at Chicago Circle
Box 4348, Chicago, Illinois 60680

Graduate *courses* are offered in some departments that do not yet offer a
degree program; they are available to all graduate students as electives.

For additional information about programs listed in this catalog, correspond
directly with the appropriate department at the listed address.

Executive Committee of the Graduate College

Jan Rocek, PhD, Dean of the Graduate College, Professor of Chemistry
Felix Candela, MA, Professor of Architecture (1972-74)
Paul Chung, PhD, Professor of Energy Engineering (1973-75)
Melvyn Churchill, PhD, Professor of Chemistry (1973-75)*
Philip Dwinger, PhD, Professor of Mathematics (1972-74)
Dorothy Gillanders, EdD, Professor of Physical Education (1973-75)
Eric Gislason, PhD, Associate Professor of Chemistry (1973-75)
Elmer Hadley, PhD, Professor of Biological Sciences (1973-75)
Robert Hall, PhD, Professor of Sociology (1973-75)
Richard Jensen, PhD, Professor of History (1973-75)**
Audrey Kouvel, PhD, Professor of Spanish (1972-74)
Nicholas Moravcevich, PhD, Professor of Slavic Languages and Literatures (1972-74)
George Rosen, PhD, Professor of Economics (1973-75)
Harriet Talmage, PhD, Professor of Education (1972-74)
P.L.E. Uslenghi, PhD, Professor of Information Engineering (1972-74)
Samuel Weingarten, PhD, Professor of Social Work (1973-74)

*Resigned October 23, 1973
**Resigned February 27, 1974

Graduate College Directory

General Information	1530 University Hall	Ext. 3320
Admissions, Registration, Nondegree Students, Petitions, Intercampus Programs	1524 University Hall	Ext. 3320
Doctor of Arts Program	1516 University Hall	Ext. 3314
Research Board and Fellowships	1529 University Hall	Ext. 3344
Theses and Records	1515 University Hall	Ext. 3320
Jan Rocek, Dean	1530 University Hall	Ext. 3313
Peter J. Coleman, Associate Dean	1518 University Hall	Ext. 3314
James L. Norr, Acting Associate Dean	1516 University Hall	Ext. 3314
William J. Otting, Associate Dean	1531 University Hall	Ext. 3344
Miss Otis Dante, Assistant to the Dean	1524 University Hall	Ext. 3325
Frank C. Rotecki, Staff Associate	1517 University Hall	Ext. 3320
Mrs. Evelyn Richter, Administrative Clerk	1515 University Hall	Ext. 3320

Campus History and Information

On February 22, 1965, the University of Illinois at Chicago Circle opened its doors at its permanent location, which takes its name from the nearby transportation interchange symbolic of the flow of people within the urban region.

The move from Navy Pier, site of the University's Chicago Undergraduate Division for nineteen years, signaled the emergence of the principal public university at the service of—and in the midst of—the state's major population center.

Just as the physical growth of the University of Illinois at Chicago Circle was designed to answer the emphatically stated educational needs of the area's citizens, so have the instruction, research, and public service programs been organized and are regularly reviewed and improved to meet these expressed needs.

One of the historic qualities of the University of Illinois is its ability to integrate the research and public service activities of its faculty, staff, and student body with its educational programs. In the setting of Chicago Circle this capability points to professional fields and disciplines that have high impact upon urban life while maintaining a commitment to a wide range of programs fundamental to the development of special inquiry.

Other University of Illinois facilities in Chicago are at the Medical Center, which houses the Colleges of Medicine (including the Abraham Lincoln School of Medicine, the School of Basic Medical Sciences, and the School of Associated Medical Sciences), Dentistry, Nursing, and Pharmacy and the Health Sciences Division of the Graduate College, the School of Public Health, and the 600-bed University of Illinois Hospital.

Location, Mailing Address, and Transportation

The Chicago Circle campus is located just south and west of the Loop in an area bounded by the Eisenhower and Ryan Expressways, Racine Avenue, and Roosevelt Road. The mailing address is Box 4348, Chicago, Illinois 60680. Transportation to the campus is by way of the CTA El-subway, which has built a special "University of Illinois-Halsted" station, and by the buses on Halsted, Harrison, and Taylor Streets and on Roosevelt Road.

Graduate Studies at Chicago Circle

The first thirteen graduate programs were established at the University of Illinois at Chicago Circle in September 1967. At the beginning of the 1974-75 academic year, master's degrees in 27 fields and doctor's degrees in 15 will be offered. Some degrees are offered as intercampus programs in cooperation with the Medical Center and Urbana-Champaign campuses of the University of Illinois. Additional graduate programs are being developed for the future. For a list of graduate units at Chicago Circle and degrees offered, see *Graduate Units at Chicago Circle*.

Directors of Graduate Studies

Each graduate program has a director of graduate studies whose responsibilities include evaluating and processing applications for admission to the Graduate College, advising graduate students on programs of study and department rules and procedures, informing graduate students and advisers about the availability of assistantships, fellowships, and other financial aids, and evaluating student progress. Directors of graduate studies are listed in *Graduate Units at Chicago Circle*.

Graduate Student Advisory Committee

Consisting of one student from each graduate program, this committee advises the Dean of the Graduate College on all matters of concern to graduate students and serves as a link between the staff of the Graduate College and the graduate student members for the Executive Committee of the Graduate College and other campus committees. Elections are held in the spring quarter. Many graduate programs also have active graduate student associations. Interested students should consult their director of graduate studies for further information.

Master's Programs

A master's degree provides advanced professional training and is usually the degree required for entry to many types of professional careers.

Most master's programs at Chicago Circle have been designed to make it possible for a full-time student to complete the degree requirements in three quarters of study or a single academic year. However, many students with

assistantships or with part-time employment outside the University take a longer period to obtain their degrees, and some programs—in social work and urban planning and policy, for example—require up to two years of study.

Five types of master's degrees are offered at Chicago Circle: the Master of Arts, the Master of Science, the Master of Arts or Science in Teaching (History and Mathematics), the Master of Social Work, and the Master of Urban Planning and Policy. Additional information on admissions, degree requirements, and particular programs can be found in *Admission, Academic and General Regulations,* and *Departments and Programs.*

Doctoral Programs

The doctorate is primarily a research degree. The candidate must demonstrate his capacity for independent research by presenting an original thesis on a topic within his major field of study. Only the most highly qualified students are encouraged to apply for admission.

The University of Illinois at Chicago Circle offers doctoral work in fifteen fields and grants three doctoral degrees—the Doctor of Arts, the Doctor of Philosophy, and the Doctor of Social Work.

The *Doctor of Arts* is a professional degree for college teachers and instructional designers. It combines the rigor and high level of scholarship in the subject matter of the Doctor of Philosophy with the acquisition of special skills in modern instructional methods. The program is designed to provide training through special courses and thesis research in such areas as curriculum design, teaching methodology, the creation of instructional materials, and educational evaluation. The development of computer-assisted instruction is particularly emphasized. The holder of a Doctor of Arts is expected to make original contributions to the knowledge and understanding of these problems as they apply to his chosen discipline. He is also expected to remain an active researcher and innovator in linking advances in his discipline to the college classroom.

The Doctor of Arts is offered in the Departments of Chemistry and Mathematics. Additional programs are being developed. A student applies to the discipline department for admission. Once admitted to the department, he chooses an adviser and together they prepare a plan of doctoral studies.

Further information can be obtained from the coordinator of the Doctor of Arts Program in the Graduate College.

The *Doctor of Philosophy* at Chicago Circle places traditional emphasis on the advancement of knowledge through independent research in the candidate's chosen field and the presentation of an original thesis. The degree is intended primarily for those who need the highest level of research training and who wish to pursue careers in colleges and universities, research institutes, and public agencies or industrial and business organizations. Within the general framework of the degree requirements, each candidate's plan of study and research is tailored to his particular needs and goals and is worked out in close consultation with his adviser and director of graduate studies.

Prospective students should consult the department listings in this bulletin for information on admissions and degree requirements, courses of instruction and areas of specialization offered, and lists of graduate faculty.

The *Doctor of Social Work* is an advanced professional degree. The program offered by the Chicago division of the Jane Addams School of Social Work is an interdisciplinary one. It requires a minor in a field outside social work and is specifically designed for the professional who is interested in a career in social policy analysis, administration, teaching at a university level, or social research. Although most students admitted to the program are holders of the Master of Social Work and have some professional practice experience, applications from persons with a master's degree in related behavioral or social sciences are considered.

Research Facilities and Opportunities

The Chicago area provides a wide range of research facilities and opportunities for graduate students. Among the better known are the American Bar Foundation, the Argonne National Laboratory, the Art Institute of Chicago, the Center for Research Libraries, the Chicago Historical Society, the Chicago Municipal Reference Library, the Cook County Law Library, the John Crerar Library, the Field Museum of Natural History, the Library of International Relations, the Museum of Negro History, the National Accelerator Laboratory, and the Newberry Library.

The various units of the University of Illinois at the Medical Center cooperate with the Chicago Circle Departments of Bioengineering, Biological Sciences, Chemistry, Physics, Psychology, and Sociology, the College of Urban Sciences, and the Jane Addams School of Social Work in encouraging joint graduate study, seminars, and the use of the Medical Library.

Many Chicago Circle units have close working relationships with public and private agencies, enabling graduate students to meet some of their degree requirements through internships, field work, and similar cooperative arrangements. Graduate students also have opportunities to work as members of research groups led by faculty members.

Research Facilities at Chicago Circle

Behavioral Sciences Building

The Behavioral Sciences Building houses research laboratories and other facilities for studies in a wide range of disciplines and fields--from anthropology to urban sciences. Some research activities are carried on through centers and institutes or are supported by interdisciplinary facilities and are described in greater detail in this section. Other research activities are carried on through facilities provided within the department.

The Department of Anthropology has three laboratories supporting studies in archaeology, linguistics, and physical anthropology. These laboratories house a wide range of equipment, including microscopes, tape recorders, VTR and 16mm filming equipment, soil core apparatus, differential thermoanalysis equipment, and dissecting tables.

The Department of Geography has extensive laboratory and darkroom facilities supporting studies in quantitative methods, cartography, soil analysis, and climatology. Included are calculators, a coordinate digitizer, a computer program library, and capabilities for mapping and spatial analysis.

The Department of Political Science has a Political Data Center that is part of the Inter-University Consortium for Political Research and provides faculty and students with access to data from national studies of political attitudes and behavior conducted over the past two decades. The department also has calculators, key punch and card sorting equipment, and an on-line link to the UICC Computer Center.

The Department of Psychology has the tools for carrying on all phases of human and animal learning, language, problem-solving, brain processes, perception, social interaction, attitude formation and measurement, child development, industrial psychology, and clinical psychology. General and special purpose computer facilities are available for programming, recording, and data analysis.

The Department of Sociology has a research methods laboratory containing IBM unit record equipment and electronic calculators, a demography laboratory containing statistical resource materials and desk calculators, and an experimental sociology laboratory with rooms for observation and interviewing. Direct access to the University computer system is provided by a 2741 Conversational Programming System Terminal.

Center for Research in Criminal Justice

The Center for Research in Criminal Justice conducts, organizes, and supports a wide range of research programs. They include forensic evaluation of point samples through flameless atomic spectroscopy and laser emission spectrography for metal-ion content, comparative studies of correctional programs and their alternatives, and studies of selected jails in Illinois.

Center for Urban Studies

The Center for Urban Studies is engaged in a number of research projects related to metropolitan data systems, urban growth and land use models, evaluations of the performance of various types of urban institutions, environmental problems, and studies of the evolution of social organizations. In addition to serving students in the College of Urban Sciences, the center also assists students from the behavioral and social sciences, education, engineering, architecture, art, humanities, and business administration.

Computer Center

The Computer Center has recently installed an IBM 370/158 computer. It has the most advanced circuitry available and is one of the first to be installed at an American university. The computer supports both batch processing and a network of remote terminals in a multiprogramming, time-sharing environment and utilizes advanced software for main-frame memory allocation and page swapping.

Most major programming languages and a large program library of applications packages are accessible from remote terminals. Also available from terminals are truly interactive PL1 and BASIC programming systems with advanced editing and debugging features that allow the user to interact with his program during both its compilation and execution.

Of particular interest is the possibility of preparing material at the terminals that is then available for use by students at any school where standard teletype or teletype compatible CRT terminals are available. A body of such material has been prepared at Chicago Circle and is currently available. Material prepared elsewhere can often be adapted for use here.

Facilities exist for both CRT and hard copy graphical applications.

The center also operates an IBM 1800 process control computer with 32,768 words of 2 microsecond core storage.

The staff of the Computer Center teach courses in programming, software design, theory of computation, and numerical analysis in cooperation with the Department of Mathematics and the College of Engineering. The staff also assist other departments in utilizing the equipment for both instruction and research.

Energy Resources Center

The Energy Resources Center in the College of Engineering is a multidisciplinary unit drawing on the faculties of various colleges of the Chicago Circle campus as well as the School of Public Health at the Medical Center for cooperative educational and research activities. Especially noteworthy are studies projecting energy needs for the Midwest and designing strategies to meet future demand; a systems analysis of the effects of coal gasification and liquefaction, including land use planning, environmental consequences, and labor and economic implications; an evaluation of current building codes with the objective designing strategies for reducing energy consumption; an analysis of the transportation system to determine how energy could be conserved through lateration of transportation patterns; and a study of nuclear power, including the possible utilization of waste heat, problems of disposing of radioactive wastes, and safety and siting factors.

German Exploratory Phonetics Laboratory

The German Exploratory Phonetics Laboratory contains recording and specialized equipment patterned after a similar installation at the University of Hamburg. Included are sound spectograph, acoustic analysis equipment, a recording studio, and equipment to measure intra-oral air pressures during speech. The laboratory also maintains a library of phonetic bulletins, cinefluoroscopic speech samples in several languages, and a comprehensive collection of German conversations.

Institute of Labor and Industrial Relations

The Institute of Labor and Industiral Relations at Urbana-Champaign offers master's and doctoral work and conducts a broad spectrum of research and policy studies. At Chicago Circle the institute's Chicago Labor Education Program provides noncredit classes, conferences, seminars, and educational consultative services to union men and women and to organized labor.

James Woodworth Prairie Preserve

The James Woodworth Prairie Preserve in the northwest suburbs of

Chicago contains more than five acres of land, about three quarters of which is virgin blacksoil tall grass prairie that represents one of the last such undisturbed tracts in northeastern Illinois. The preserve is therefore a priceless and irreplaceable resource for biological, ecological, and other scientific research. A building on the corner of the property contains laboratory facilities and a demonstration room for exhibits and lectures.

Library

Consisting of the Main Library, the Science Library, and the Math Library, the library of the University of Illinois at Chicago Circle provides resources for students in all curricular areas and constantly growing collections of materials for current and projected graduate programs and for research.

As of January 1, 1974, library holdings included more than 539,300 books and bound periodicals and more than 544,100 other items, such as documents, maps, music scores, and microform materials. Currently, the library subscribes to more than 7,300 periodicals. Leaflets describing library services within each department are available throughout the library.

Main Library

All books, journals, and periodicals except those in the fields of chemistry, biology, geology, physics, astronomy, and mathematics are housed in the Main Library. The main building also houses Administrative Offices, Technical Services, Collections Development, and Public Services. The latter division includes the Reserve Book Room, the Circulation Department, the Reference Department, the Curriculum Library, the Audio Center, the Documents Section, the Interlibrary Loan Office, the Periodicals-Microforms Desk, and the Special Collections Department.

The *Jane Addams Memorial Collection* is located in Hull-House and includes the papers and manuscripts of individuals and organizations associated with the settlement house movement in Chicago. Especially noteworthy are the papers of the Hull-House Association, the Juvenile Protective Association, the Immigrants Protective League, Jane Addams, Russell W. Ballard, Paul Jans, and Adena Miller Rich. The collection also includes some 3,000 volumes, 4,000 photographs, and numerous newspaper clippings, articles, and periodicals. It is a major resource for the study of reform in the twentieth century.

The *Reference Collection* includes encyclopedias, handbooks, indices, bibliographies, and specialized reference tools. Reference librarians are available at the Reference Desk, 8 a.m.-5 p.m., Monday-Friday, to assist students. Phonodiscs, tapes, listening rooms, and listening equipment are available in the Audio Center. The Documents Section houses United States and United Nations documents, British parliamentary papers, and Illinois state and municipal documents and provides reference service for these materials. Also included within the section are ERIC indices and ERIC Reports since 1970. The Curriculum Library maintains and circulates a laboratory collection of curriculum guides, textbooks, juvenile literature, standardized tests, games, kits, and simulations useful to students preparing to teach.

Interlibrary Loan Service is offered through the Reference Department of the Main Library to faculty and graduate students engaged in research. The conditions of this service are set by the Interlibrary Loan Code of the American Library Association and by the regulations of individual lending libraries. Interlibrary loan procedures are available in the Interlibrary Loan Office.

The *Circulation Department* maintains, on open shelves, books that may be borrowed for one month. One renewal is possible unless the book is needed by another reader. A fine of 15 cents per day is charged for overdue books. A lost book should be reported immediately to avoid excess charges. If such books are not found after a reasonable time, the user will be billed for the cost of the book and a $3 processing fee. Framed reproductions of prints and paintings are also available for loan. The Periodical-Microforms Collection contains more than 257,000 items of microfilm, microcards, and microfiche and the necessary reading and duplicating equipment. A Periodical-Microforms clerk assists in the location and use of these materials.

The *Special Collections Department* administers Chicago Circle's collection of rare books, maps, archives, and manuscripts. Rare books include material on philosophy, modern architecture, slavery, and 17th-century French history and collections of modern poetry, Georgian poets, literary first editions, early dictionaries, fantastic fiction, and Chicago authors. The Map Section contains government depository collections from the United States Geological Survey and the Defense Mapping Agency Topographic Center and other political, physical, geological, and economic maps. Antiquarian maps of the Great Lakes region and the Russian empire and Eastern Europe are housed in the Rare Book Room. The University Archives serve as a repository for retired records of the Chicago Circle campus. The Manuscript Section contains the papers of individuals and organizations active in the growth and development of Chicago since 1971 and includes collections relating to social welfare, housing, juvenile delinquency, settlement houses, politics, civil organizations, education, labor and other areas of urban interest. Material on Jane Addams and Hull-House is in the Dr. Preston Bradley Library in Jane Addams's Hull-House. A Manuscript Section guide lists all manuscript collections with brief descriptions of all fully processed collections. All material is available to faculty and graduate students for research.

Science Library

The Science Library, 3500 Science and Engineering South, houses monographs and periodicals classed in astronomy, biology, chemistry, geology, and physics and selected monographs in science-related and general reference classes. Also available are abstracts and indices covering the pure sciences, selected government documents, and reserve materials for 300- and 400-level courses. Interlibrary loan pick-up-and-delivery service is available, with all loan processing handled in the Main Library.

Math Library

The Math Library, 430 Science and Engineering Offices, contains about 12,000 volumes, including most books classified QA (Library of Congress

classification for mathematics), mathematics periodicals, microfilm materials, selected reprints of mathematics articles, and reserve materials for all mathematics courses. The Math Library does not provide complex reference services; patrons are advised to use the reference services at the Main or Science libraries. Circulation policies for books and periodicals are the same as in the Main Library.

Use of Other Chicago-Area Libraries

Several excellent libraries in the Chicago area are available to graduate students without special authorization; however, most libraries permit use of their materials only within their building. Materials may be borrowed from both the Urbana-Champaign and the Medical Center campuses of the University upon presentation of valid identification. If one wishes to have materials sent to Chicago Circle, he follows the procedures for an interlibrary loan.

The Chicago Circle library is a member of the Center for Research Libraries, 5721 South Cottage Grove Avenue, Chicago. The center has developed extensive collections of research materials, described in its *Handbook.*

For additional information, refer to "Chicago-Area Libraries," available from the Reference Department, or check at the Reference Desk.

Office of Instructional Resources Development

The Office of Instructional Resources Development (OIRD) provides a comprehensive and coordinated media service to assist faculty members and teaching assistants in using instructional technology conveniently, efficiently, and effectively. The office consists of two consultative divisions and six operational divisions. It can provide instructors with any service they might want to help improve their teaching, ranging from advice on the instructional design of courses to the delivery and operation of audio-visual equipment in their classroom. The office has been particularly active in supporting the development of the Doctor of Arts Program and works closely with the associated faculty. Thesis students are especially encouraged to utilize the services and facilities provided. For example, a Doctor of Arts thesis in chemistry may involve designing a teaching module in organic chemistry, include video cassettes showing molecular structures and bonding recorded from a computer graphics terminal. There are also opportunities for students to work with the PLATO computer complex or the cinematographic and television production groups.

Research Support Information Center

The Research Support Information Center in the Graduate College assists both faculty members and graduate students in locating sources of external support for research activities. The center, 1527 University Hall, serves as a central depository of information concerning the research funding of governmental agencies and private foundations, i.e., fellowship programs, doctoral dissertation support, research grants, and agency-defined research programs. Perspectives on past and present funding opportunities can be

obtained from the back files. The center also has a wide range of periodicals, newsletters, and bulletins to assist faculty and students in identifying funding sources. A staff member is available on Tuesdays, Wednesdays, and Fridays.

Science and Engineering Laboratories, Science and Engineering South

These two buildings provide extensive research facilities for the Bioengineering Program and the Departments of Biological Sciences, Chemistry, Criminal Justice, Geological Sciences, Physics, Energy Engineering, Information Engineering, Materials Engineering, and Systems Engineering. Especially noteworthy are shop facilities, animal quarters, plant growth rooms, transmission and scanning electron microscopes, 60- and 100-megacycle NMR, ESR, analytical mass, and high-resolution infrared visible and ultraviolet spectrometers, ORD apparatus, a liquid scintillation counter, an automatic X-ray diffractometer, molecular beam apparatus, scanning machines, spark chamber readout systems, facilities for chemical and physical forensic studies, high-pressure high-temperature hydrothermal apparatus, gas control furnaces, atomic absorption equipment and allied accessories, and a dory fully equipped for sedimentologic and water column sampling and bathymetry.

Small Groups Laboratory

The Small Groups Laboratory in the Behavioral Sciences Building provides facilities and equipment for research in anthropology, criminal justice, geography, political science, psychology, and sociology. The laboratory has sound-insulated interview rooms, observation suites equipped with one-way windows and audio intercom, and a professional-quality video system. Portable video equipment is maintained for field research.

Survey Research Laboratory

The Survey Research Laboratory of the University of Illinois has facilities on the Chicago Circle and Urbana-Champaign campuses. It offers a wide range of services to faculty and students, to local, state, and municipal agencies, and to various groups working in the public interest. The laboratory conducts mail, telephone, and personal interview surveys throughout Illinois, processes survey data, maintains a social sciences data archive, acts as a census data processing center for Illinois, and maintains a master sample for Illinois and its major cities. In addition, the laboratory trains faculty and students in survey methods, advises investigators on all phases of survey research, offers noncredit workshops and lectures on various aspects of survey research and data analysis, and assists in the design of survey practicums.

Urban Systems Laboratory

The Urban Systems Laboratory in the College of Engineering is an applied research and problem-solving unit concerned with multidisciplinary studies involving technological as well as social and economic aspects of urban systems. Of particular interest are the infrastructure urban systems, especially

the transportation, communication, shelter, environment, service delivery, and physical resources systems. The laboratory is especially concerned with the development and application of methods of analysis and with the development and evaluation of alternative methods of improving the performance, utility, efficiency, economy, and responsiveness of urban systems.

Assistantships, Fellowships, and Financial Aid

Various types of financial assistance are available each year to promising students in all fields of study in the Graduate College. Information in this section deals chiefly with aid administered by the University of Illinois. It should be noted, however, that there are also nationally sponsored fellowships that provide support for graduate students for study either at the University of Illinois or elsewhere, such as the National Science Foundation fellowships. Other fellowships are offered through foundations, industrial concerns, and individuals. Further information and application procedures for nationally sponsored fellowships may be obtained by writing directly to the agency concerned or to the University department in which the student plans to major.

The University of Illinois at Chicago Circle offers five basic types of financial aid for graduate students: fellowships, assistantships in teaching and research, tuition-and-fee waivers, loans, and employment. Each type of assistance is described in the following sections. In the administration of these programs and in selecting students for participation in them, the University of Illinois does not discriminate on the grounds of race, creed, color, sex, or national origin of any applicant or participant.

Fellowships

Fellowship stipends are gratuities awarded in recognition of scholarly achievement and promise. They enable a student to pursue his graduate studies and research without requiring him to render any service. The stipends of different fellowships vary, but with few exceptions they are currently not less than $1,800 for the nine-month academic year. The fellow's stipend is legally regarded as a gift, not as compensation for services rendered. Funds for income tax are not withheld. Unless explicitly stated otherwise, all fellows whose appointments are administered by the Graduate College are exempt from tuition and fees. A fellow is required to pursue a full program of graduate study (at least 16 hours per quarter) and may engage in remunerative employment only to the extent permitted by the award or approved in writing by the Dean of the Graduate College.

University Fellowships. Awarded on the basis of an all-campus competition and not restricted to any particular field of graduate study listed

in this bulletin, University fellowships are for nine months and carry a stipend of not less than $2,000, plus exemption from tuition and all regular fees except the Hospital-Medical-Surgical Insurance fee.

A student who receives a University fellowship is also eligible to accept a part-time assistantship related to his field up to a maximum of one-quarter time. Under such an appointment, the fellow's basic stipend remains unchanged and tax-free, but the salary for teaching or research is generally subject to income tax. University fellows, whether they hold a part-time assistantship or not, must carry full programs of graduate study (at least 16 quarter hours per quarter) unless expressly authorized by the Dean of the Graduate College to carry reduced programs. This course-load requirement may include 499—Thesis Research. Students whose first interest is in teaching should so indicate on their applications.

Industrial, Endowed, and Special Fellowships. Various industrial firms, foundations, and private individuals have generously donated funds to support a number of special fellowships for graduate students at the University of Illinois. The stipends and supplemental allowances of these fellowships are not uniform, and most of them are restricted to students in particular areas of study. Further information may be obtained from the director of graduate studies in the department in which the student plans to register.

Assistantships

The various departments of the University employ graduate students as either teaching assistants or research assistants. The duties of a teaching assistant usually involve such activities as classroom instruction, supervision of a laboratory section, the guidance of discussion sections, and grading essays, term papers, examinations, and other assignments. Research assistants participate in research activities under the supervision of faculty members. In some instances the work of a research assistant may be related to his thesis research; in others it may be entirely different. Although most research assistantships are awarded to graduate students who have completed one or more quarters of graduate work at the University of Illinois, new students are eligible for such appointments. Each assistant is paid a salary for services rendered, and, under present ruling, this salary generally is subject to income tax.* The weekly clock hours of service required of assistants are 37½ for a full-time appointment and the proportional fraction of time for part-time appointments. Those whose appointments are for between 25 and 67 percent time inclusive are exempt from tuition and all fees except the Hospital-Medical-Surgical Insurance fee.

The student who can devote full time to his studies usually enrolls for 16 quarter hours. A student who wishes to carry a heavier load may enroll for 17 to 20 hours. He should consult his department adviser. A student holding a half-time assistantship or employed outside the University for an equivalent amount of time is advised to enroll for not more than 12 hours.

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*The District Director of Internal Revenue has ruled that under certain conditions income tax need not be withheld from remuneration paid to research assistants engaged in thesis research.

Graduate students who hold academic appointments for the winter and spring quarters of one academic year, either as employees or fellows, and for whom tuition and/or fees have been provided through waiver or through cash payment by an outside agency, are entitled to a waiver of the same kinds of tuition and fees for the summer quarter immediately following, provided they do not hold appointments during the summer quarter.

Tuition-and-Fee Waivers

A graduate tuition-and-fee waiver provides exemption from tuition and all incidental fees (except the Hospital-Medical-Surgical Insurance fee) for the academic year. To hold these awards students must be in residence and must register for at least 12 hours per quarter during the academic year. They may accept part-time or incidental employment not to exceed 20 hours a week either within or without the University.

Veterans who are admissible to a graduate program and who meet certain residence requirements may be eligible for exemption from tuition and certain fees under the Illinois statute covering military scholarships. Further information may be obtained from the Office of Financial Aid, 1312 University Hall.

How to Apply

Application materials and instructions may be obtained from the Graduate College or from any graduate department. Only one application form is needed to apply for any of the types of financial aid listed.

To ensure that an applicant will be considered for all fellowships and other financial assistance programs for the fall quarter beginning in September, the application should be filed with the major department no later than the preceding February 15. Applications for assistantships and tuition-and-fee waivers are accepted by departments after that date, but students are urged to apply as early as possible, since many departments offer assistantships or recommend tuition-and-fee waivers at the same time they consider applications for fellowships.

Announcement of Awards

Most fellowship awards are announced by the Graduate College on or about April 1. Recipients are expected to accept or decline by April 15. The University of Illinois adheres to the following resolution adopted by the members of the Association of American Universities and a number of other graduate schools in North America:

In every case in which a graduate assistantship, scholarship, or fellowship for the next academic year is offered to an actual or a prospective graduate student, the student, if he indicates his acceptance before April 15, will still have complete freedom to reconsider his acceptance and to accept another fellowship or graduate assistantship. He has committed himself, however, not to resign an appointment after this date unless he is formally released from it.

Financial Aid

Graduate students should apply directly to the Graduate College for information related to fellowships, scholarships, tuition waivers, assistantships, and other forms of assistance specifically reserved for graduate students. *However*, graduate students interested in National Direct Student Loans, University Long-Term Loans, and employment through the College Work-Study Program should apply to the Office of Financial Aid. Veterans benefits are also processed by the Office of Financial Aid.

Loans

The Chicago Circle Office of Financial Aid administers and processes loan programs for which graduate students are eligible to apply. Students should apply directly to the Office of Financial Aid for information regarding any of the following loan programs.

National Direct Student Loans (NDSL)

1. The applicant must file a Chicago Circle Application for Financial Aid and submit the ACT Family Financial Statement. No other financial statement is acceptable.
2. An eligible graduate student may borrow up to $2,500 per year, to a total of $10,000, for his undergraduate and graduate years of study.
3. Funds are disbursed to the student quarterly.
4. Interest on the NDSL is set by federal law at 3 percent annually.
5. Repayment is to begin nine months after the student has ceased to be enrolled in at least a half-time course of study at any institution of higher education.
6. The entire loan must be repaid with interest within ten (10) years after repayment has begun, with minimum payments set at $30 per month.
7. Deferment of repayment is to be arranged with the University Bursar.

University Long-Term Loan (ULT)

1. The applicant must file a Chicago Circle Application for Financial Aid and submit the ACT Family Financial Statement. No other financial statement is acceptable.
2. An eligible graduate student may borrow up to $2,500 per year, to a total of $7,500, for his undergraduate and graduate years of study.
3. Funds are disbursed to the student quarterly.
4. Interest on the ULT is 3 percent annually.
5. A cosigner is required. The cosigner must be a United States citizen or legal permanent resident of the United States, must be aged 21 or over, and must be fully employed. The Board of Trustees has ruled that the cosigner may not be an employee of the University of Illinois.
6. Repayment is to begin four months after the student has left the University.
7. The entire loan must be repaid within a period of seven years, with minimum payments set at $30 per month.

8. Deferment of repayment because of attendance at another institution of higher education is dependent upon annual verification and written agreement of the note cosigner.

Federally Insured Student Loans (FISL)

Graduate students who are *not* legal residents of Illinois should consult with their home state banks or FISL agencies. The requirements and provisions of FISL programs are essentially the same throughout the United States. The Illinois Guaranteed Loan Program, described below, is a review model for nonresidents.

Illinois Guaranteed Loan (IGL)

1. The student must be a resident of Illinois, as defined in the program literature.
2. The student must file the IGL application with a participating Illinois bank, credit union, or other commercial lender.
3. The student has the *option* of submitting the ACT Family Financial Statement to the Chicago Circle Office of Financial Aid:
    a. Students who submit the ACT Family Financial Statement will be considered for the federal interest subsidy if they qualify.
    b. Students who *do not* submit the ACT Family Financial Statement will *not* be considered for the federal interest subsidy. The lending institution will then have the option of providing a loan to the student, and the student will be obligated to make periodic interest payments during the course of his study.
4. Funds are disbursed by the banks through the University on an *annual* basis.
5. Interest on an Illinois Guaranteed Loan is established by federal law as follows: for a student who qualifies for the federal interest subsidy, interest at 7 percent annually does not accrue until nine months after the student has ceased to pursue a full-time course of study. If a student does not qualify for a federal interest subsidy, interest at 7 percent annually begins to accrue with the use of the funds.
6. Repayment is to begin both for subsidized and unsubsidized loans nine months after the student ceases to pursue a full-time course of study.
7. The entire loan plus interest must be repaid within a period of six years after repayment has begun, with minimum payments graduated from as low as $30 to as much as $150 per month, depending on the size of the loan.
8. Deferments for attendance at other institutions and for other acceptable reasons are negotiated with the administrators of the Illinois Guaranteed Loan Program.

Short-Term Emergency Loans

Students may request short-term emergency loans from $5 to $100.

These loans may be used for educationally related expenses other than tuition. The loan must be paid within 45 days or by the end of the quarter, whichever date is earlier. Request forms may be obtained from the offices of the Dean of Men or the Dean of Women, 809 University Hall.

Employment

The Student Employment office, 1301 University Hall, welcomes the opportunity to counsel students about employment. The office also offers students a library of job-reference materials job listings, interviews, and referrals for employment to University departments and to agencies and business firms in the Chicago area. Securing a position through proper application and retaining that position through good work is, of course, the responsibility of the individual.

Student Services

The University of Illinois at Chicago Circle provides a wide range of services to its students. The Dean of Student Affairs coordinates the activities and functions of the Dean of Men, the Dean of Women, the director of Veterans Affairs, the Office of Financial Aid, the Student Counseling Service, Placement Services, the Office of Foreign Student Affairs, the Health Service, and the Office of Organizations and Activities. The Dean of Student Affairs also administers the student discipline system. The health insurance program is administered by the Insurance Office under the director of Business Affairs, and the Chicago Circle Center, parking, food services, lockers, and housing services are under the supervision of the Office of Auxiliary Services.

These services are described below. Additional information will be found in the Student Handbook.

Placement Services

Placement Services assists graduate students in career planning, determining vocational objectives, and finding permanent employment. The staff provides an on-campus interviewing program, lists current employment opportunities, maintains directories and lists of prospective employers, and assists students in the preparation of career resumes. Further information can be obtained in 4050 Behavioral Sciences Building.

Chicago Circle Center

The Chicago Circle Center houses recreational facilities, food services, lounges, the main bookstore, and meeting rooms for campus and community functions. Recreational facilities include archery, fencing, billiards, bowling, handball, rifle range, swimming pool, table tennis, and weight lifting. A crafts program provides equipment and instructors for such activities as pottery, woodworking, graphics, painting, and photography. The center also sponsors various cultural and public affairs programs ranging from concerts to poetry readings and from film series to public lectures. Lounges throughout the center include a main lounge on the second floor, supervised study and faculty and staff lounges on the third floor, a music and television lounge on the third floor, and a commuter lounge on the eighth floor.

Circle Children's Center

The Circle Children's Center provides full-time day care facilities for the children (ages 2 to 6) of students, faculty, and staff. Rates are on a sliding scale, based on family income. Call 996-8663 for additional information and application forms.

Financial Aid

For detailed information on fellowships, scholarships, tuition waivers, assistantships, and other forms of assistance specifically reserved for graduate students, refer to the chapter *Assistantships, Fellowships, and Financial Aid.* That chapter also presents information about National Direct Student Loans, University Long-Term Loans, Federally Insured Student Loans, the Illinois Guaranteed Loan Program, Short-Term Emergency Loans, the Work-Study Program, and the Student Employment office.

Food Services

The Chicago Circle Center provides full cafeteria service for breakfast and lunch on the third floor and in the Cardinal Room and breakfast, fountain, snack, and vending services in the Pier Room on the second floor. Full cafeteria service for breakfast and lunch is also available on the first floor of the Behavioral Sciences Building, and vending services are located throughout the campus, including the basement of University Hall, the fifteenth floor of Science and Engineering Offices, the second floor of Science and Engineering Laboratories, and the second floor of Science and Engineering South. Special arrangements have been made for graduate students to have access to food vending machines in the evenings and on weekends.

Housing Services

Housing Services helps solve the housing problems of graduate students. Housing can be arranged at special rates at nearby motels for newly arrived students while they are searching for permanent quarters. Daily and weekly rates are available.

Every effort is made to assist those wishing to share their accommodations and those seeking such an arrangement. Housing Services also cooperates with off-campus organizations specializing in locating roommates.

Brochures and listings of privately owned housing, including furnished and unfurnished apartments, houses for rent or sale, and rooms for rent, are available for inspection in Housing Services and are posted on the Auxiliary Services bulletin board on the first floor near the main entrance of Chicago Circle Center. Persons listing housing accommodations have signed a pledge not to discriminate on the basis of race, religion, or national origin. Further information can be obtained from Housing Services, 704 Chicago Circle Center (996-5055 or 996-5058).

Health Insurance

The Insurance Office (1219 University Hall) administers the Chicago Circle Hospital-Medical-Surgical Insurance program. Unless a student can provide evidence of coverage through his own insurance plan, he must join the plan provided by the University. The precise details of the coverage and benefits are set out in the insurance policy, but it may be stated informally that the program is designed to protect students from the financial hardship that might be incurred by illness or accident requiring hospitalization. The University Health Service (see *Health Service*) supplements the insurance program by providing ambulatory clinic care.

Lockers

Lockers are available for student use in most classroom buildings on the campus. Further information about this service and details of the rules governing the use of lockers can be obtained from the Office of Auxiliary Services, 704 Chicago Circle Center.

Foreign Student Affairs

The Office of Foreign Student Affairs is located on the eighth floor of University Hall. It serves both foreign- and native-born students interested in international educational exchange programs and opportunities. The staff provides evaluations of proficiency in written and spoken English, guidance in career planning, counseling on personal problems (financial, scholastic, and social), and information on cross-cultural activities and programs. In addition, the staff provides documents and endorsements for extensions of nonimmigrant visas and information about employment opportunities on and off campus, travel outside the United States, certification of attendance, and foreign army deferments. The staff also has information on the application of immigration regulations to students and faculty members who are citizens of foreign countries.

Organizations and Activities

The Office of Organizations and Activities advises more than 190 registered student organizations. It provides assistance in the organization and registration of organizations and in establishing their structure, financial operations, space reservations, event planning, record keeping, and publicity. Further information can be obtained in 712 Chicago Circle Center.

Parking

Parking facilities are limited. The University provides two types of parking lots: key card lots at $25 per quarter and daily fee lots at $1 per entry. Parking fees are subject to periodic review and change. Further information can be obtained in 709 Chicago Circle Center.

Student Counseling Service

The Student Counseling Service, on the tenth floor of University Hall, provides a broad range of counseling services for graduate students, including personal counseling, marital counseling, educational counseling, and speech and hearing evaluations. In addition, special and continuing programs in group therapy, peer group counseling, and encounter groups and rap groups develop with considerable spontaneity in response to student demand. For those with special concern for assessment of interests or talents, for mid-career counseling, or for technical reading, individual or group programs can be arranged.

Health Service

The University Health Service, on the eleventh floor of University Hall, offers full ambulatory clinic care, including X-ray and laboratory facilities, electrocardiogram, liver function testing, VD testing and treatment, gynecological service, birth control and abortion counseling, a mental health unit, and psychological testing. Dental services are provided by the College of Dentistry of the University of Illinois at the Medical Center. Further information can be obtained in 1118 University Hall.

Veterans Affairs

Veterans can obtain assistance from the director of Veterans Affairs, 805 University Hall. The director works closely with the Office of Financial Aid, the Student Counseling Service, Placement Services, and the Student Employment office in providing a wide range of services to veterans.

Admission

The academic year at Chicago Circle consists of three eleven-week quarters (including the final examination periods) that begin in September (fall quarter), January (winter quarter), and March (spring quarter). The summer quarter, also eleven weeks, begins in June. Some colleges and departments offer summer courses, institutes, and other programs of shorter duration than the usual eleven-week session.

A student may seek admission to any one of the four quarters; however, the scheduling in many programs, especially in the professional colleges and schools, makes it desirable that students enter in the fall quarter.

Applicants are considered on an individual basis. They must meet the minimum requirements for admission to the Graduate College as well as the requirements of the particular department or program in which they wish to study. Prospective students should consult the appropriate sections of this bulletin for specific admission requirements.

Graduate College Requirements

The minimum requirements are:
1. Except for seniors at the University of Illinois at Chicago Circle (see 4 below), a baccalaureate or its equivalent from an accredited college or university.
2. A cumulative grade point average of at least 3.50 (A=5.00) on the final 90 quarter hours (60 semester hours) of undergraduate study. The grade point average is computed on all of the work taken in the quarter or semester in which the student began the final 90 quarter hours of undergraduate study.

   The cumulative grade point average obtained in all work completed beyond the baccalaureate is also computed and is taken into consideration.
3. Recommendation for admission by the department or program to which application is made and by the Dean of the Graduate College.
4. Senior standing at the University of Illinois at Chicago Circle. Applicants are considered when they are within 8 quarter hours of the baccalaureate. See *Graduate Study by Seniors at the University of Illinois at Chicago Circle.*

Department Requirements

Most departments and programs have adopted requirements higher than the minimums listed above, or require in addition Graduate Record Examination test scores, letters of recommendation, undergraduate training in designated courses or fields, statements of the applicant's career goals, or other information. Consult the appropriate sections of this bulletin for specific department requirements.

Unassigned Students

The Graduate College accepts a limited number of unassigned students who are not pursuing a degree but are endeavoring to fulfill a specific educational aim. For details, see *Admission Status.*

Auditors

At the discretion of the instructor, a graduate student regularly registered at one of the campuses of the University of Illinois may attend classes as an auditor. If he wishes to have an audited course recorded on his transcript he must pay the Course-Visitor-Auditor Fee (see *Tuition, Fees, and Other Charges*) if he is not registered in Range I (12 or more quarter hours).

Visitors

Persons not registered at the University of Illinois are permitted to attend classes other than laboratory courses. Visitors must file with the Office of Admissions and Records a permission form bearing the approval of the instructor and the Dean of the Graduate College and pay the Course-Visitor-Auditor Fee (see *Tuition, Fees, and Other Charges*).

Application Procedures

Applications for admission may be obtained from the Office of Admissions and Records, the departments, or the Graduate College. A prospective student should apply for admission at least two months before the beginning of the quarter in which he wishes to enroll. The number of graduate students who can be admitted is limited and applications are processed in the order in which they are received. Admission consideration ceases when enrollment capacities are reached; therefore, it is in the best interest of the applicant to submit his application and supporting credentials as early as possible.

All applications must be accompanied by the nonrefundable application fee of $20.

Applicants are reminded that most departments and programs require Graduate Record Examination test scores, letters of recommendation, statements of career goals, and other supporting credentials. These materials should be sent directly to the department director of graduate studies. Final admission recommendations cannot be made until all required documents have been received by the department or program to which admission is sought.

Foreign Applicants

Persons who have completed their studies outside the United States must present all post-secondary school credentials. Such credentials must include a record of all studies completed to date, grades or examination results received (including failing as well as passing grades), maximum and minimum grades obtainable in the school, rank in class, degrees, diplomas, and certificates earned, and length of the school year. Documents must be authentic or certified, and those not written in English must be accompanied by certified English translations.

Foreign applicants whose native language is not English are required to take the Test of English as a Foreign Language (administered by the Educational Testing Service, Box 899, Princeton, New Jersey 08540). The TOEFL is given at regularly scheduled intervals at testing centers throughout the world. In exceptional cases, foreign applicants who are already in the United States may be admitted to the Graduate College on limited status without having taken the test. They will be required to take the test on their arrival in Chicago and before being permitted to register for courses. In cases of clearly demonstrated knowledge of the English language, the test may be waived.

Several English language courses for foreign students are available at Chicago Circle (English Composition 103-105). Because these courses are designed to increase English competency, foreign students are urged to enroll in them.

All foreign applicants who plan to finance their study at the University of Illinois from personal resources must certify that they will have sufficient funds to cover their expenses. Obtain the appropriate form from the Office of Admissions and Records.

Foreign students granted admission receive from the Office of Admissions and Records all appropriate documents, including the certification forms that are used in applying for visas to enter the United States.

Readmission Applicants

A graduate student who did not register in the quarter immediately preceding the one in which he wishes to enroll, or who withdrew before the end of the quarter immediately preceding the one in which he wishes to enroll, *and* who had not received approval for Off-Quarter Vacation or Leave of Absence, must submit an application for readmission. The rule does not apply to the student who was registered in the spring quarter and who wishes to register in the fall quarter.

Applications for readmission should be submitted no later than two weeks before the beginning of the quarter to which readmission is sought and must be accompanied by the $20 nonrefundable application fee.

Graduate Study by Seniors at the University of Illinois at Chicago Circle

With the approval of the concerned department, the college, and the Graduate College, a senior at the University of Illinois at Chicago Circle may

be admitted to the Graduate College if he is within 8 quarter hours of his baccalaureate. He will be admitted on limited status for a maximum of four quarters, pending completion of the baccalaureate. Courses used to fulfill undergraduate degree requirements may not be applied toward a graduate degree.

Upon recommendation of the department, an undergraduate student may be given graduate credit for graduate courses taken in his senior year. However, these courses may not be applied toward the baccalaureate.

Admission Status

Each new or readmitted student is issued one of the following types of Permits to Enter:

A. Regular

B. Limited

This is a probationary status for students who:

1. Have less than a 3.50 entering grade point average;
2. Have department deficiencies to be removed;
3. Present foreign credentials that must be evaluated at the time of registration; *or*
4. Are within 8 quarter hours of their baccalaureate. (See *Graduate College Requirements* and *Graduate Study by Seniors at the University of Illinois at Chicago Circle.*)

Permits for status B1, B2, and B3 are issued with the understanding that the major department will determine deficiencies or prerequisites and will advise the student on his program of study.

A student may be admitted on limited status for a maximum of four quarters in residence or 24 quarter hours, whichever occurs earlier. The department shall specify the conditions for admission to full status in writing to the student and the Graduate College, preferably at the time of admission but not later than the end of the first quarter in residence. If the conditions are not met within the foregoing limits, the Graduate College will initiate drop action.

C. Nondegree

Nondegree status may be granted in the following circumstances:

1. The student participates in an intercampus program and is or will become a degree candidate on another campus of the University of Illinois (see *Intercampus Graduate Programs*).
2. The student participates in a special nondegree program offered by a department or other unit.
3. The student does not wish to pursue a degree program or a department nondegree program but intends to continue his education in one or several fields. Applications for admission under this option must be accompanied by a letter outlining the student's plan of study and explaining why admission is sought on nondegree-unassigned status. A member of the Graduate College staff will serve as adviser to the student in this category.

Nondegree status is not a probationary status and may not be used instead of limited status. In admitting nondegree students, neither the

Graduate College nor any unit at Chicago Circle makes a commitment toward admission to a degree program.

Should the nondegree student later be admitted to a degree program, credits earned while on nondegree status will ordinarily not be transferred. However, petitions for such transfer, supported by the department, are considered on an individual basis.

Intercampus Graduate Programs

Several departments have developed intercampus programs by which Chicago Circle students can participate in degree programs offered by departments or units at the Urbana-Champaign or the Medical Center campus of the University of Illinois. Students whose applications to an intercampus program are accepted will be able to fulfill all or most degree requirements by taking courses at Chicago Circle; they will register at the degree-awarding campus for independent study, special topics, or thesis research as required by the program, meet the requirements of the degree-awarding department or unit, and have members from the degree-awarding department or unit on their examining committees. In the case of the Bioengineering Program, students take courses at both the Medical Center and Chicago Circle. They register for thesis research at the campus from which they propose to receive their degree. See *Graduate Units at Chicago Circle* for a list of intercampus programs and the department directors of graduate studies for further details.

Traveling Scholar Program

This program enables doctoral-level students to take advantage of educational opportunities—specialized courses, unique library collections, unusual laboratories—at any of the other Big Ten universities or the University of Chicago. The student registers and pays fees at Chicago Circle. The program is sponsored by the Committee on Institutional Cooperation (CIC). For further information, consult the department director of graduate studies.

Academic and General Regulations

A student should familiarize himself with the academic requirements of the Graduate College and of the department or program in which he is working. He is responsible for complying with these regulations and for fulfilling all his degree requirements. Every graduate student should have a copy of the Graduate College bulletin Graduate Study 1974-75, the official statement of policy. The usual procedures and requirements of the Graduate College are stated in this bulletin. Every graduate student should also have a department brochure, if issued.

Petitions

A student may petition the Dean of the Graduate College for exceptions to any of the following regulations, but he should do so only after consulting with his adviser and his director of graduate studies. Petition forms may be obtained from the Graduate College and from department or program offices.

Transfer of Credit

1. *Transfer of Advanced Degree Credit.* Unless the department or program specifies otherwise at the time of admission, a doctoral candidate who has received a master's degree or its equivalent will receive 48 hours of credit toward the minimal 144 quarter-hour requirement for the doctoral degree. A petition is not required.

2. *Transfer of Course Credit.* Consideration is given to the transfer of graduate work completed in accredited institutions. The number of credit hours that may be transferred is determined on an individual basis. No transfer is automatic. Ordinarily credit earned by an irregular undergraduate student is not transferred if the student is later admitted to the Graduate College. Only graduate work that meets at least the quality and content of courses offered at the University of Illinois at Chicago Circle is considered for transfer. The number of credit hours in a given course that may be transferred is limited to the number initially given. Six quarter hours are the equivalent of four semester hours (or at the Urbana-Champaign campus, one semester unit of graduate credit). Consideration is given to the transfer of credit in four categories:
   a. Graduate work completed elsewhere before admission to Chicago Circle and for which a degree was not awarded.

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b. Graduate work completed elsewhere after admission to Chicago Circle and for which a degree was not awarded. A student considering taking graduate work elsewhere during a Leave of Absence or Off-Quarter Vacation or under the Traveling Scholar Program should first consult his adviser and director of graduate studies about his plans and the courses that may be considered for transfer.

c. Graduate work completed in the senior years at Chicago Circle that was not applied to the baccalaureate.

d. Graduate work completed at Chicago Circle as a nondegree student. (For restrictions, see *Admission Status.*)

Procedures

A petition is required and should not be submitted until the student has completed at least 12 quarter hours of graduate work at Chicago Circle. The department or program evaluates the student's petition and makes its transfer recommendations to the Graduate College. The recommendation must show the courses requested by the student for transfer, the courses recommended or not recommended for transfer by the department or program, and the number of quarter hours of credit recommended. The petition must be accompanied by a transcript showing grades and certification from the registrar or college dean of the applicable institution that the courses are graduate level and were not used toward fulfillment of the requirements for a degree.

Work Completed in the Senior Year at Chicago Circle

Upon recommendation of the department or program, the undergraduate college, and the Graduate College, graduate credit may be given for graduate courses taken in a student's senior year at the University of Illinois at Chicago Circle. Such courses must not have been applied toward the baccalaureate. A petition is required.

Advisers

Each graduate student must have an adviser in the department or program in which he is a degree candidate. The adviser assists in planning a program of graduate study that fits the needs of the student and satisfies department or program and Graduate College requirements. A new student should consult his director of graduate studies to discuss the selection of an adviser.

Courses of Instruction

Courses open to graduate students are of two types. Those numbered 300-399 are open to advanced undergraduate and graduate students. Those numbered 400-499 are generally open only to graduate students. Some 300-level courses are available for graduate credit in departments other than those offering advanced degrees. Students should consult their advisers about the possibility of using these courses as minors.

A number of courses carry variable credit. At the 300 level, additional

work, such as special reports, papers, or projects, is required of a student who registers for the maximum credit allowed. At the 400 level, some research, reading, and independent study courses provide variable credit; the proportion of time devoted to a particular activity can thus be indicated on the student's record.

The number 499 is used exclusively to designate thesis research.

Academic and General Regulations

Prerequisites. Exceptions to prerequisites listed in course descriptions in this catalog may be granted only with the consent of the instructor and under special circumstances.

Program Changes. A student has the option of dropping a course until the end of the sixth week of the quarter. Thereafter a course may not be dropped. Holders of fellowships, tuition-and-fee waivers, and student visas must maintain the required number of credit hours.

Grades

Letter Grades. Final grades for courses are recorded as A, B, C, D (lowest passing grade), and E (failure). For all master's and doctoral work a cumulative grade point average of 4.00 (A=5.00) on all course work presented for graduate credit, exclusive of courses numbered 499 (Thesis Research), is mandatory.

W—Officially withdrawn from the course without penalty.

In—Incomplete. An In must be removed by the end of the student's second quarter in residence subsequent to that in which it was received, or if he is not in residence, by the end of the first calendar year subsequent to that in which the In was received. An In that is not removed by the deadline will be changed automatically to an E, F, or U.

Df—Grade temporarily deferred. At the end of a continuing course sequence the deferred grade Df for all quarters must be converted either to a specific letter grade or to an In. Deferred grades should be used only for courses numbered 499 (Thesis Research) and continuing seminar or sequential courses.

S—Satisfactory; U—Unsatisfactory. To be used only as the final grade in courses numbered 499 (Thesis Research), in zero-credit courses, and in specifically approved courses. In the case of specifically approved courses, if the required work has not been completed by the end of the quarter, at the instructor's discretion an In (Incomplete) may be given.

P—Pass; F—Fail. Used only in courses taken under the pass-fail grading option. If the required work for the course has not been completed by the end of the quarter, at the instructor's discretion an In (Incomplete) may be given. A graduate student may take courses on a pass-fail basis provided that:

1. The courses are not within the student's immediate area of specialization.
2. Such courses account for no more than one-sixth of the total number of course hours taken at the University of Illinois at Chicago Circle and counted toward a degree.
3. The student declares his intention to take a course on this basis at the time of registration.

Continuation and Probation Rules

Minimal Criteria of the Graduate College

A student may continue to register as long as he remains in good standing, defined as satisfactory academic progress and achievement and as satisfactory behavior within the code of conduct described in the Student Handbook. The minimal Graduate College academic criteria are as follows:

1. If during two successive quarters in residence the cumulative grade point average is below 4.00, the student is placed on probationary status. This warns the student that, if his academic record continues to be unsatisfactory, he will not be permitted to continue.
2. After three consecutive quarters in residence with a cumulative grade point average below 4.00, the student will not be eligible for further registration.

In exceptional cases, and on department recommendation, the Graduate College may permit a student to continue to register. A petition is required.

The Graduate College issues probation and ineligibility-for-registration notices.

Department Standards

Departments and programs may require a higher level of performance and may apply additional criteria. For example, if a student accumulates an excessive number of incomplete grades, he may not be permitted to register until the courses have been completed or he may be required to register for a lighter course load until the incomplete grades have been converted to letter grades.

Each department or program has a graduate advisory committee that regularly reviews the student's performance and progress. If it is dissatisfied with a student's record, it issues a warning to the student and sends a copy to the Graduate College. If, after at least one quarter, a second review indicates continued dissatisfaction with the student's performance and progress, the student and Graduate College are informed and the Graduate College notifies the student that he is ineligible to register.

Credit

Graduate College credit is not given for courses in which the student was an auditor or received a grade of E, F, or U.

Department or Program credit is usually granted only if the student received a grade higher than the minimum passing grade. Students should consult the department listings for details.

Repetition of Courses. A student is permitted to repeat a course for credit if it is (1) designated in the Timetable with the phrase "May be repeated for credit" or (2) a course in which he received a failing grade. (The original failing grade continues to be included in the computation of the grade point average.)

Course Loads

The student who can devote full time to his studies usually enrolls for 16 quarter hours. A student who wishes to carry a heavier load may enroll for 17 to 20 hours. He should consult his department adviser. A student holding a half-time assistantship, or who is employed outside the University for an equivalent amount of time, is advised to enroll for not more than 12 hours.

Fellowship Holders. Fellowships are awarded to superior students, who are therefore required to carry a minimum of 16 quarter hours of credit.

Tuition-and-Fee Waiver Holders. Students awarded special Graduate College tuition-and-fee waivers must carry a minimum of 12 quarter hours of credit.

Minimum Full-Time Study. For purposes of enrollment certification to the Immigration and Naturalization Service of the United States Department of Justice, the Graduate College considers a student to be pursuing a minimum full-time program of study if he enrolls for: (1) 12 or more quarter hours of graduate credit, or (2) a program of graduate and undergraduate courses.

Auditor and Visitor Privileges

A graduate student regularly registered at one of the campuses of the University of Illinois may be permitted to attend classes as an auditor (without credit) at the discretion of the instructor. Students who wish to have their audited courses recorded on their transcript must pay the Course-Visitor-Auditor Fee (see *Tuition, Fees, and Other Charges*) if they are not registered in Range I (12 or more quarter hours).

A student should not enter on his program registration card any courses he attends as an auditor.

Visitors not registered at Chicago Circle are permitted to attend classes other than laboratory courses. Visitors must file with the Office of Admissions and Records a permission form bearing the approval of the instructor and the Dean of the Graduate College and pay the Course-Visitor-Auditor Fee (see *Tuition, Fees, and Other Charges*).

Regulations Pertaining to Degrees

All Graduate Degrees

Grade Point Average. For all master's and doctoral work a cumulative grade point average of 4.00 on all course work presented for graduate credit, exclusive of courses numbered 499 (Thesis Research), is mandatory.

Foreign Language Requirement. The foreign language requirement is left to the individual department or program, subject to the approval of the Graduate College.

Areas of Specialization. Every student must select a major area of specialization within his program. The major area of specialization consists of courses closely related to each other, not all of which are necessarily offered by the major department. Students should consult their director of graduate studies for details.

A minor area of specialization consists of a group of course offerings that have a distinct relationship, though they may be offered in more than one department. If a student elects, or is required by department regulations to declare, a minor area outside his major department, the courses chosen must be approved by the departments or divisions concerned.

Note: The following general requirements for the individual degrees are the minimum standards of the Graduate College. Students should consult the detailed department and program listings for a full statement of particular requirements. It is the student's responsibility to be aware of all regulations and requirements and to satisfy them as early as possible.

Master's Degree

Residence. 24 quarter hours of graduate work, including not more than 12 hours in courses titled Independent Study and Thesis Research, must be taken within two calendar years.

These 24 quarter hours (which may include 499—Thesis Research) must be earned at the University of Illinois at Chicago Circle. Exceptions may be granted by the Graduate College upon recommendation of the department.

Credit Hours.
    At least:
    48 quarter hours beyond the baccalaureate
    16 quarter hours at the 400 level
    24 quarter hours in the major area of specialization, including 12
    hours at the 400 level
    Not more than:
    18 quarter hours in 499—Thesis Research in a 48-quarter-hour
    program

Thesis. A student electing or required to write a master's thesis should file the title with the Graduate College at least six weeks prior to graduation. Thesis students must register for a minimum of 8 hours in 499—Thesis Research, but for no more than 18 hours. Credit in thesis research will be applied only after the thesis is accepted. Specific instructions on the format of the thesis are contained in the leaflet, "Instructions for Preparation of Theses," available in the Graduate College office, 1523 University Hall.

Examinations. If an examination is required, its structure is determined by the department. If a master's thesis is presented, the candidate defends it before a committee appointed by the Dean of the Graduate College on the recommendation of the department. This committee consists of at least three persons, one of whom must have permanent membership on the Graduate Faculty. One member of the committee may be from outside the department or from outside the University. The approval of the thesis by a majority of the committee is required.

Time Limitation. A candidate for a master's degree must complete all requirements within four calendar years after his initial registration in the Graduate College. In special circumstances the student, after consultation with his adviser, may petition the Graduate College and his department for an extension of this time limit.

Doctoral Degree

Residence. At least 12 quarter hours beyond the master's level or its equivalent must be taken at the University of Illinois at Chicago Circle in regularly scheduled courses (excluding 499—Thesis Research and Independent Study) within one calendar year. Three consecutive quarters of at least 8 quarter hours each (which may include 499—Thesis Research) must be taken at the University of Illinois at Chicago Circle.

Credit Hours. At least 144 quarter hours beyond the bachelor's degree must be obtained for the doctoral degree.

Thesis. The candidate for a doctoral degree must demonstrate his capacity for independent research by the presentation of an original thesis on a topic within his major field of study.

Continuous Registration Requirement. The candidate for a doctoral degree must register each quarter, except summer quarters, until he receives his degree. After satisfying the minimum credit requirement (144 quarter hours of courses and thesis research beyond the baccalaureate), the student maintains his status as a candidate by registering for a full load of credit hours in 499—Thesis Research, until his dissertation has been accepted.

Registration for Zero Credit. If the requirement for continuous registration imposes financial hardship, or if the student is not making any use of University or staff time, he may petition the Graduate College for permission to register for zero credit in 499—Thesis Research. The privilege of registering for zero credit is not granted for the quarter in which the candidate presents and defends his dissertation.

Prior Publication of Research Findings. Candidates engaged in thesis research may find it desirable or expedient to publish prior to the conferring of the degree certain findings that later will be incorporated in the dissertation. In such cases, appropriate acknowledgment of the earlier publication should be included in the dissertation. The Graduate College encourages such publication, but the dissertation may not be published in its entirety before all degree requirements, including the defense of the dissertation, have been completed.

Instructions for Thesis Preparation. The format of the thesis is specified in the leaflet, "Instructions for Preparation of Theses." No later than the date specified in the current calendar of the Graduate College, the candidate must submit to the Graduate College the original and first carbon copy (or two copies reproduced by an approved method) of his thesis and one typewritten copy of an abstract not exceeding 600 words.

Microfilm Fee. Each candidate, following the final examination and acceptance of his thesis, must pay a $20 microfilm fee, which provides for the microfilming of the complete thesis, with one copy deposited in the library of the University of Illinois at Chicago Circle, and the publication of the abstract in *Dissertation Abstracts.*

Examinations. On the recommendation of the department or program, the Dean of the Graduate College appoints a separate committee for the preliminary examination and the thesis defense.

1. The timing, content, and nature (written, oral, or both) of the preliminary examination is at the discretion of the department or program.

The examining committee consists of at least five persons, at least two of whom must be permanent members of the Graduate Faculty. The appointment of one member from outside the University is encouraged. The committee reports its recommendations in writing to the Dean of the Graduate College. The committee vote is pass or fail. A candidate may not be passed if he receives more than one vote of fail and the committee may require that specified conditions be met before the passing recommendation becomes effective. The Dean, on the recommendation of the committee, may permit a second examination.

2. On completion of the dissertation, the candidate defends the thesis before a committee consisting of at least four persons, of whom two must be permanent members of the Graduate Faculty. The appointment of one member from outside the department, program, or University is encouraged. The committee follows the same rules and procedures as indicated above for the preliminary examination.

Teaching. Except in special cases, teaching is required of each doctoral candidate as part of his professional training and growth.

Time Limitations. Candidates must complete the degree requirements within six calendar years after initial registration in a doctoral program. In special circumstances the student, after consultation with his adviser, may petition the Graduate College and his department for an extension.

Off-Quarter Vacation

A student may elect to attend any three quarters in one calendar year. If he chooses to use a quarter other than the summer as his vacation or Off-Quarter, he must file an application for Off-Quarter Vacation with the Office of Admissions and Records before the first day of instruction of the quarter he wishes to use as Off-Quarter Vacation. Application blanks are available in that office. If the vacation quarter is other than the summer quarter, the student must attend the summer quarter of that calendar year if he wishes to retain his status as a continuing student.

The student approved for an Off-Quarter Vacation is entitled to the same privileges as continuing students, provided he follows correct procedures. If he wishes to advance enroll, he must present written notice to the Office of Admissions and Records prior to the time for mailing advance enrollment materials to continuing students. Advance enrollment materials are prepared and mailed during the sixth week of the quarter. He may make arrangements with the Insurance Office to continue his Hospital-Medical-Surgical Insurance during the Off-Quarter Vacation.

Leave of Absence

For valid reasons, a graduate student affiliated with a department or program may petition for a leave of absence for a maximum period of four consecutive quarters, including the summer quarter. Justification must be exceptionally strong for students in their first quarter of residence. A request for leave must be submitted *prior* to the period of leave and approved by the Dean of the Graduate College. A student who has been granted a leave of

absence need not reapply for admission. Approved petitions are filed with the Office of Admissions and Records. Petition forms are available from the Graduate College and directors of graduate studies.

Returning students who wish to participate in residual registration should advise the Office of Admissions and Records in writing at least one month in advance so that registration material may be prepared.

Tuition, Fees, and Other Charges

All students are assessed tuition and fees, which are payable as part of registration. The amount of tuition and the service fee vary with the number of credit hours for which the student registers. Tuition (but not the Hospital-Medical-Surgical Insurance and Health Service fees) also varies according to the resident or nonresident status of the student in the state of Illinois.

Tuition and Fees—Chicago Circle
(Subject to Change)

	Range I 12 quarter hours and above		Range II Less than 12 and more than 5 quarter hours		Range III ½ through 5 quarter hours		Range IV 0 credit only Resident and Nonresident
	Resident	Nonresident	Resident	Nonresident	Resident	Nonresident	
Tuition	$165	$495	$113	$333	$ 62	$172	$ 31
Service Fee	32	32	24	24	14	14	7
*Hospital-Medical-Surgical Insurance Fee	10	10	10	10	10	10	10
Health Service Fee	5	5	5	5	5	5	5
Total	$212	$542	$152	$372	$ 91	$201	$ 53

Tuition for Zero-Credit Courses. Students taking one or more courses for zero credit, but no courses for credit, are assessed for tuition and fees as follows:

    a. *For study on campus:* One-half of the Range III resident tuition and one-half of the Range III service fee, each rounded to the next higher

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*Students presenting evidence of equivalent medical insurance coverage do not have to pay the University insurance plan fee. This evidence should be presented at the In-Person Payment area during either advance enrollment or residual registration. If the above is not done, the student must pay the fee and then submit the evidence and a petition for refund to the University Insurance Office within the first ten days of instruction during the quarter for which the fee was paid.

even dollar, and the full insurance fee. (No charge will be assessed, however, for University employees who register at the request of their department only in zero-credit courses especially established to improve the work of the employee.)

b. *For study off campus,* including graduate registration in absentia: One-half of the Range III resident tuition, rounded to the next higher even dollar, but no service fee and no insurance fee.

Students simultaneously taking one or more courses for zero credit and one or more courses for credit are assessed for tuition and fees on the basis of the credit course(s) only.

Tuition and Fee Deferment Information

A deferment of up to half of the tuition and fees may be granted to students for personal reasons. There is a service charge of $2.

Students having a delinquent account with the University are not granted a personal deferment. Holders of tuition waivers are not granted a deferment of their fees. Parking fees and late registration fines are not deferable and must be paid at the time of registration.

The schedule below indicates the minimum payment required at the time of registration.

	Range I 12 quarter hours and above		Range II 5½ through 11½ quarter hours		Range III 0 through 5 quarter hours	
	Resident	Nonresident	Resident	Nonresident	Resident	Nonresident
Tuition and Fees (subject to change)	$212	$542	$152	$372	$ 91	$201
Deferment Service Charge	2	2	2	2	2	2
*Maximum Amount Deferable	107	272	77	187	47	102
Minimum Amount Payable at Registration	$107	$272	$ 77	$187	$ 46	$101

*Payment of the deferred portion of tuition and fees is due 25 days after classes begin, regardless of the payment terms indicated on the billing statements mailed each month. Students may not register in succeeding quarters until the deferred portion has been paid.

Illinois State Scholarship Recipients. Students who hold Illinois State Scholarship awards that are less than the total assessed tuition and fees must pay the difference at registration. This difference may be deferred only if written evidence of other University financial aid in an amount sufficient to cover the difference is presented at the time of registration.

Recipients of Other Financial Aid. Students who hold other financial aid awards (National Direct Student Loan, Educational Opportunity Grant, or private scholarships) may defer their tuition and fees in full if the total of their financial aid award exceeds their tuition and fee assessment. If the

financial aid award does not cover the total assessment, the difference must be paid at registration. To obtain full or partial deferment, written evidence of the financial aid award must be presented at registration.

Residence Classification of an applicant is determined on the basis of information given on his application and on other credentials. Fees are assessed in accordance with this decision.

A student may be reclassified at any time by the University upon the basis of additional or changed information. However, if the student is classified in error as a Resident student, the change in tuition shall be applicable beginning with the quarter following the reclassification; if the student is classified in error as a Nonresident, the change in tuition shall be applicable the term in which the reclassification occurs, provided the student has filed a written request for a review in accordance with these regulations.

If a student believes that he has a legitimate cause for a change of residency status, he may petition for reclassification on the form provided by the Office of Admissions and Records. Petitions are considered *within thirty days* from the date designated in the official University calendar as that upon which instruction begins for the academic period for which the fee is payable. However, if the nonresident tuition was not assessed on or prior to that date, the claim for refund may be filed *within thirty days* after the nonresident fee was assessed and the student was given notice of its assessment. Additional evidence to substantiate a request may be required. If the student expects to ask for a change of residence classification, it is advisable for him to request that the adjustment be made prior to the registration period.

In the event a student who claims he is a resident is dissatisfied with an adverse ruling of the director of Admissions and Records, he may obtain a review of such decision by the Legal Counsel of the University by filing a written request with the director of Admissions and Records within twenty days after he has been notified of the ruling.

Further information concerning residency may be secured from the Office of Admissions and Records. A brochure titled *Regulations Governing Assessment of Resident or Nonresident Student Fees* is also available.

Exemptions and Assessments

A student may be exempted from one or more of the following charges if he qualifies under the stated conditions:

Tuition is waived for:

1. Holders of tuition-waiver scholarships.
2. All academic employees of the University or allied agencies on appointment for at least 25 percent but not more than 67 percent of full-time service.
3. All permanent nonacademic employees of the University or allied agencies on appointment for at least 25 percent of full time who register in University courses in Ranges II or III.
4. Holders of graduate tuition-and-fee waivers awarded by the Graduate College.
5. Holders of grants or contracts from outside sponsors that provide payments to cover the total costs of instruction.

6. Teachers and administrators who cooperate in the practice teaching program. (Exception is allowed for each quarter of assignment within the same calendar year—September through August.)
7. Persons registered in noncredit seminars only.
8. University employees registered at the request of their departments in noncredit courses especially established to improve the work of the employee.
9. Emeriti.

The nonresident portion of tuition (if the enrollee is subject to payment of tuition) is waived for:

1. All staff members (academic, administrative, or permanent nonacademic) on appointment for at least 25 percent of full time with the University or allied agencies.
2. The faculties of state-supported institutions of higher education in Illinois.
3. The teaching staff in private and public elementary and secondary schools in Illinois.
4. The spouses and dependent children of those listed in 1 and 2. (Dependent children are those who qualify as dependents for federal income tax purposes.)
5. Persons actively serving in one of the armed forces of the United States who are stationed and present in Illinois in connection with that service.
6. The spouses and dependent children of those listed in 5, as long as they remain stationed, present, and living in Illinois.
7. Members of families of foreign diplomats whose assignment requires residence within Illinois.

For fee assessment purposes, a staff appointment must be for not less than three-fourths of the quarter. This is interpreted as a minimum of nine weeks in a quarter. Staff tuition-and-fee privileges do not apply to students employed on an hourly basis in either an academic or nonacademic capacity or to persons on leave without pay.

For fee assessment purposes, a permanent nonacademic employee is defined as a person who has been assigned to an established, permanent, and continuous nonacademic position and who is employed for at least 25 percent of full time. University employees appointed to established civil service positions whose rate of pay is determined by negotiation, prevailing rates, or union affiliation are entitled to the same tuition-and-fee privileges accorded other staff members under the regulations.

A student who resigns his staff appointment, or whose appointment is cancelled before he has rendered service for at least three-fourths of the quarter, becomes subject to the full amount of the appropriate tuition and fees for that quarter unless he withdraws from his University classes at the same time the appointment becomes void, or unless he files clearance for graduation within one week after the appointment becomes void.

Fees

The *Service Fee* is applied toward the operating expenses of Chicago Circle Center, the financing of the center building, and the cost of the Student Activities Program.

The Service Fee is waived for:

1. All staff members of the University or allied agencies who are on appointment for at least 25 percent of full time.
2. Holders of graduate tuition-and-fee waivers awarded by the Graduate College.
3. Students registered in absentia.
4. Students registered in courses taught off campus.
5. Holders of grants or contracts from outside sponsors if the Service Fee is charged to the contract or to grant funds.
6. Cooperating teachers and administrators described under *Exemptions*, item 6.
7. Persons registered in noncredit seminars only.
8. University employees, registered at the request of their departments, in noncredit courses for the purposes of improving their work.
9. Emeriti.

The *Course-Visitor-Auditor Fee* of $15 is assessed all class visitors who are not in Range I in the tuition-and-fee schedule.

The *Late-Registration Fine* of $15 is levied against all students who complete registration after classes have begun.

The *Hospital-Medical-Surgical Insurance Fee* is the same for all students, regardless of the number of hours for which they have enrolled or of their Illinois residence status. All students enrolled and in attendance at Chicago Circle are covered by a health insurance policy, for which they pay a fee each quarter at registration. Eligible dependents of insured students (spouse and/or unmarried dependent children under nineteen years of age) may also be insured if the student makes application to the University Cashier (406 University Hall) within the time specified by the insurance policy.

If a student withdraws from the University, he does not receive an insurance fee refund since he remains insured for the balance of the quarter from which he withdrew. Special provisions exist for students to be covered by this insurance during the summer months, irrespective of their registration for that part of the year. For further information, consult the Insurance Office, 1219 University Hall.

The *Deferred-Fee Charge* of $2 is assessed when arrangements have been made with the Office of Business Affairs to defer payment of fees. The charge must be paid on the day the agreement is reached and is nonrefundable. See *Tuition and Fee Deferment Information.*

The *Lost Photo-Identification Card Fee* of $1 is assessed for replacing a lost or destroyed Photo-Identification Card, issued to the student at the time of his first registration at Chicago Circle. Cost for replacing the current Student Fee Receipt Card is 50 cents.

The *Transcript Fee.* A student is issued one transcript of his record without charge. For each additional transcript, a fee of $1 is assessed.

Refunds

Students who withdraw from the University or from a course within certain time periods are entitled to a refund of a portion of the tuition and fees they have paid.

Withdrawal from the University. The full amount of tuition and fees, *less a nonrefundable charge* of $31 for those enrolled for 12 or more hours and $30 for those enrolled for 11½ and fewer hours, is refunded to students who withdraw *within the first ten days of instruction* in a quarter. No refund is made if withdrawal occurs thereafter.

Withdrawal from a Course. If such withdrawal results in a reduction in the student's program to a lower tuition-and-fee range, the full difference is refundable during the *first ten days of instruction.* No refund is made if withdrawal occurs thereafter.

Withdrawal by a Visitor. A full refund is issued if the withdrawal is made *within the first ten days of instruction.* No refund is made if withdrawal occurs thereafter.

The calendar in the quarterly Timetable indicates the date on which the regulations are effective.

Withdrawal to Enter Military Service. When a student withdraws to enter military service, he must be on active duty within ten days after withdrawal to receive a refund of tuition and fees. It is his responsibility to present proof of his active-duty status. The most effective way of presenting such proof is to have the personnel officer of the unit to which he is assigned certify to the University the date of the student's assignment to active duty.

Transcripts

Each student who has paid all his University fees is entitled to one transcript free of charge. (See *Transcript Fee.*) However, students who are in debt to the University are not eligible for readmission and are not entitled to official transcripts and diplomas until the indebtedness is cleared.

Confidentiality of Records. As custodian of student records, the University assumes an implicit trust and, accordingly, uses extreme care and concern in recording and disseminating information about students.

The Office of Admissions and Records issues transcripts of official records *only* on the written request of the student. The same holds true for academic information needed for financial assistance or honors recognition. Class schedules are not released to unauthorized persons. Information that is considered public (available in a public directory, such as name, date of attendance, curriculum, and degrees and honors earned) is released but only after great care has been taken to identify the originator of such a request as one who demonstrates a legitimate "need to know." For more complete information, the *Policy on the Release of Information Pertaining to Students* should be consulted.

Departments and Programs

Admission and degree requirements of the departments are in addition to those of the Graduate College. Students must familiarize themselves with *both* sets of requirements. Exceptions to prerequisites listed in course descriptions in this bulletin may be granted only with the consent of the instructor and under special circumstances.

ANTHROPOLOGY

Robert L. Hall, Chairman of the Department

Professors: Pedro Armillas, Laura A. Bohannan, Charles A. Reed

Associate Professors: Susan T. Freeman, Merwyn S. Garbarino, Robert L. Hall, Paul Hockings, Jack H. Prost, Sylvia J. Vatuk

Assistant Professors: Elizabeth A. Brandt, Waud H. Kracke, James L. Phillips, Stephen L. Schensul

The department offers work leading to the Master of Arts.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study and must rank above the 70th percentile on the verbal and quantitative test of the Graduate Record Examination. Three letters of recommendation from former professors and a brief statement outlining the student's professional goals must be submitted. In exceptional cases, students who have averages of less than 4.00 but above 3.50 or who do not have an adequate background in anthropology may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Such students may be admitted on limited status and will be expected to remedy department deficiencies before being admitted to regular status.

Degree Requirements

A minimum of 48 quarter hours is required for the master's degree. All candidates must complete the course work outlined below, pass a comprehensive examination, and submit a thesis. Students engaged in specialized thesis research that demands a reading knowledge of a foreign language or a working knowledge of statistics are expected to demonstrate satisfactory comprehension of the relevant language or skill. Foriegn students must have adequate facility in the English language.

Students are encouraged to complete a minimum of 36 quarter hours of study before admission to the comprehensive examination for the MA. The distribution of graduate courses is:

12 quarter hours in Anthropology 400—Theory and Method in Anthropology; 430—Theory and Method in Physical Anthropology; 450—Theory and Method in Prehistory.

Anthropology 410—Advanced Study of Kinship (required of those specializing in social-cultural anthropology).

16 quarter hours in advanced courses in anthropology or related fields, such as sociology, political science, psychology, or history.

A minimum of one seminar in the anthropological field of specialization.

No more than 15 hours in Anthropology 499—Thesis Research.

After three quarters of residence a candidate ordinarily is expected to pass a comprehensive examination covering physical anthropology, archaeology, and ethnology of one culture area, such as North America, Mesoamerica, Africa, or Europe.

Courses for Graduate and Advanced Undergraduate Students

310.   PEASANT SOCIETIES. 4 HOURS. Research and reading in the comparative study of peasant societies in diverse regions of the world; special emphasis on a critical review of the anthropological literature delineating a peasant stratum of social organization and defining its characteristics. Prerequisites: Junior standing, 8 hours of either social anthropology or sociology, and consent of the instructor.

311.   CULTURAL PROBLEMS IN URBANIZATION. 4 HOURS. The processes of urbanization and of cultural and societal adjustments to urban life; case studies on the variety of adjustments to urban life. Prerequisite: Anth 213.

314.   KINSHIP, FAMILY, AND HOUSEHOLD. 4 HOURS. Comparative study of the institutions of marriage, family, and household; the extension of kinship norms and values to other aspects of culture and society. Prerequisite: Anth 213.

315.   COMPARATIVE RELIGIOUS MOVEMENTS. 4 HOURS. Same as Religious Studies 315. Analysis of religious behavior; special reference to the emergence of messianic cults in Africa and Melanesia and among North American Indians and New World Negroes. Prerequisites: Junior standing, 8 hours of either social anthropology or sociology, and consent of the instructor.

316.   ECONOMIC LIFE OF PRIMITIVE PEOPLES. 4 HOURS. Patterns of production, distribution, and consumption in non-Western cultures. Cultural variation in attitudes toward labor, concepts of property, and prestige and wealth. Prerequisite: 8 hours of social anthropology; for nonmajors, junior standing and consent of the instructor.

317.   THE CROSS-CULTURAL STUDY OF SOCIAL CONTROL. 4 HOURS. Cultural-jural structures in non-Western societies; modes of dispute settlement, nature and range of sanctions, and processes of social control. Prerequisites: Junior standing and Anth 213 or 327.

320.   PSYCHOANALYTIC ANTHROPOLOGY. 4 HOURS. For social scientists. Introduction to Freud's thought and theories on dreams, child development, character, neurosis, and other psychic phenomena; the cross-cultural application of Freud's theories. Anthropological influences in the development of psychoanalytic ego psychology. Prerequisites: Graduate standing or Anth 220; consent of the instructor.

321.   CULTURAL EVOLUTION. 4 HOURS. Critical review of theories; examination of the mechanisms of change using ethnographic materials and data on cultural change and cultural contact. Prerequisite: Anth 200.

322.   COMPARATIVE METHODS IN SOCIAL ANTHROPOLOGY. 4 HOURS. Introduction to the several kinds of comparative methods, including field work and small-sample and large-sample studies. Prerequisite: Anth 213.

325.   MEDICAL ANTHROPOLOGY. 4 HOURS. Significance of anthropological analysis and the cross-cultural perspective for medical care. Medicine as a cultural adaptive system. Social organization, politics, and economics of medical care systems, folk and modern. Folk medicine. Cross-cultural perspectives on psychiatric care. Prerequisite: Anth 200.

327.   PRIMITIVE POLITICAL SYSTEMS. 4 HOURS. Data and theory pertinent to non-Western political systems; a cross-cultural study of political behavior. Prerequisites: Junior standing and Anth 213.

330.   PRIMATE EVOLUTION. 4 HOURS. Same as Biological Sciences 330. Paleontology and systematics of fossil primates as illuminated by the anatomy, ecology, and behavior of the living populations. Prerequisite: Anth 231 or BioS 282 or 318.

331.   HUMAN EVOLUTION. 4 HOURS. Same as Biological Sciences 331. Phylogeny of the primate order and the problems of speciation; particular emphasis on the relative roles of culture and nature as selective forces in human evolution. Prerequisite: Anth 231 or BioS 282 or 318.

350. PROBLEMS IN PREHISTORIC ARCHAEOLOGY. 4 TO 12 HOURS. May be repeated for credit up to a total of 12 hours. Archaeological field techniques and principles of the study of prehistory. Case studies from selected areas of the Old and New Worlds. Prerequisites: 12 hours of archaeology and consent of the instructor.

351. PREHISTORY OF THE NEAR EAST. 4 HOURS. Consideration of southwestern Asia and northeastern Africa as the core area in which the first civilizations emerged. Emphasis on the late Quaternary to about 5000 B.C.; the interrelationships between changing environment, human ecology, and cultural evolution. Prerequisite: Anth 251 or consent of the instructor for qualified students from other departments.

352. EARLY CIVILIZATION OF THE OLD WORLD. 4 HOURS. Early civilization and incipient urbanization in Eurasia and Africa, with focus on the development of urban centers and archaic states; preconditioning factors in the post-Pleistocene, Mesolithic, and Neolothic Ages. Prerequisite: Anth 251 or 351.

355. FIELD PROBLEMS IN ARCHAEOLOGY. 6 TO 12 HOURS. Application of advanced techniques to the solution of special problems of archaeological field investigations; laboratory analysis under field conditions at an off-campus location. Prerequisites: Anth 245 or 255 or concurrent registration in Anth 255; consent of the instructor.

361. PROBLEMS IN MESOAMERICAN ETHNOLOGY. 4 HOURS. Same as Latin American Studies 354. Intensive investigation of selected problems from the Mesoamerican area; special emphasis on religion, economics, and social organization. Prerequisite: Anth 261.

362. PROBLEMS IN AFRICAN ETHNOLOGY. 4 HOURS. Survey of the indigenous cultures of Africa; native cultures as reconstructed coterminously with their early historical contacts with the Western world; additional data on present-day African cultures. Prerequisites: Junior standing and Anth 263.

363. URBAN CULTURES OF AFRICA. 4 HOURS. The indigenous urban centers of sub-Saharan Africa and the multicultural and multiracial metropolitan areas of colonial and contemporary Africa; special reference to the processes of segregation and detribalization. Prerequisite: Anth 263 or 362.

364. PROBLEMS IN NORTH AMERICAN ETHNOLOGY. 4 HOURS. Intensive reading and research on special problems of religious, economic, and social systems of New World native peoples. Prerequisite: Anth 264.

365. PROBLEMS IN PACIFIC ETHNOLOGY. 4 HOURS. Ethnological survey of the indigenous peoples of Micronesia, Polynesia, Melanesia,

and Australia; special emphasis on the social, economic, and religious life of representative groups. Prerequisites: Junior standing and 8 hours of social anthropology.

366. PROBLEMS IN SOUTH ASIAN ETHNOLOGY. 4 HOURS. Theoretical and substantive problems in South Asian social organization; special emphasis on systems of social stratification, kinship and family structure, religion, economy, and political processes in the context of social change. Prerequisites: Junior standing, Anth 213 and 266.

367. PROBLEMS IN SOUTH AMERICAN ETHNOLOGY. 4 HOURS. Same as Latin American Studies 367. Intensive reading and research on theoretical and ethnographic problems in South American Indian social structures and cultures. Special attention to the influence of Levi-Strauss's ideas on the formulation of cultural theory in South America. Prerequisite: Graduate standing or Anth 213, 265.

368. PROBLEMS IN EUROPEAN ETHNOLOGY. 4 HOURS. Advanced reading and research on the ethnology of rural Europe; study in depth of selected case materials. Emphasis on community, kinship, religious and economic systems, and methods of social control; research techniques and the nature of source materials. Prerequisite: Anth 213.

380. PROBLEMS IN LINGUISTIC ANALYSIS. 4 HOURS. Same as Linguistics 380. The methods and techniques used in linguistics, with reference to actual language data; emphasis on anthropological applications. Prerequisite: Anth 280 or Ling 305.

395. SEMINAR ON ANTHROPOLOGY. 2 TO 4 HOURS. May be repeated for a total of 16 hours of credit. For graduate students and anthropology majors; open, with the approval of the department, to seniors minoring in anthropology. Reading, study, and discussion of selected problems. Prerequisite: Consent of the instructor.

399. INDEPENDENT STUDY. 2 TO 12 HOURS. May be repeated for credit. Independent study under the supervision of a staff member. Prerequisites: Junior standing and approval of the department.

Courses for Graduate Students

400. THEORY AND METHOD IN SOCIAL ANTHROPOLOGY. 4 HOURS. Survey of contemporary and historical approaches to problems of field and library research. Prerequisite: Consent of the instructor.

410. ADVANCED STUDY OF KINSHIP. 4 HOURS. Investigation of patrilineal, matrilineal, and bilateral kinship systems; the correlations between kinship systems and social structure; the relationships of ecological factors and kinship organization to rural and urban communities. Reading and research on special problems of kinship, marriage, residence, inheritance, authority patterns, and change. Prerequisite: Consent of the instructor.

411. VISUAL ANTHROPOLOGY: PRINCIPLES. 8 HOURS. Theory and practice of the use of visual media in behavioral science field research. Lectures, workshops, and field projects. Students who are interested in a sequence of courses beginning with Anthropology 411 should arrange with the department for special advising. Prerequisites: Graduate standing in a social science, formal training or equivalent knowledge of the photographic process, and consent of the instructor.

412. VISUAL ANTHROPOLOGY: FIELD METHODS. 4 HOURS. Ethnographic film production; researching and filming a suitable sociological subject in northern Illinois; workshop in filming and editing techniques. Prerequisites: Graduate standing in a behavioral science, Anth 411, and consent of the instructor.

413. VISUAL ANTHROPOLOGY: ANALYSIS. 4 HOURS. Ethnographic film editing; workshop in editing techniques; individual guidance in editing students' research films. Prerequisites: Graduate standing in a behavioral science, Anth 411, 412, and consent of the instructor.

414. PSYCHOLOGICAL ANTHROPOLOGY. 4 HOURS. Advanced work on the relationships between the psyche, culture, and society; special reference to cross-cultural investigations. Problems of methodology. Prerequisite: Consent of the instructor.

416. VISUAL ANTHROPOLOGY: KINESICS. 4 HOURS. Nonverbal communication; historical survey of the study of nonverbal communication; workshop in recording and analyzing human interactions. Prerequisites: Anth 411 and consent of the instructor.

427. POLITICAL ANTHROPOLOGY. 4 HOURS. Problems in analysis and description of non-Western political systems and their articulation into modern state systems. The relationship of the levels of political complexity to theories of political behavior. Prerequisite: Consent of the instructor.

430. THEORY AND METHOD IN PHYSICAL ANTHROPOLOGY. 4 HOURS. Genetics and selection as correlated with the adaptive radiation of the primates, particularly the biological, environmental, and cultural factors associated with the evolution of man. Prerequisite: Consent of the instructor.

450. THEORY AND METHOD IN PREHISTORY. 4 HOURS. Aims and methods of archaeological reconstruction; particular attention to paleoecology, the interpretation of archaeological findings in social terms, and the application of scientific knowledge from other fields to archaeological problems. Prerequisite: Consent of the instructor.

480. SEMINAR ON SOCIOLINGUISTICS. 4 HOURS. Same as Linguistics 480. Past and current approaches to sociolinguistics; variations of linguistic structure with social structure among different linguistics groups. Prerequisite: Anth 380.

490.   SEMINAR ON COMPARATIVE SOCIAL INSTITUTIONS IN WESTERN AND NON-WESTERN SOCIETIES. 4 HOURS. May be repeated twice for credit. Each seminar selects for intensive study a single problem relating to such social institutions as social stratification, political organization, warfare, or religion. Prerequisite: Consent of the instructor.

491.   SEMINAR ON ETHNOLOGY. 4 HOURS. May be repeated twice for credit. Advanced seminar on the analysis of ethnological data, focusing on the interpretation of field data from selected geographic regions and on correlated theoretical problems. Prerequisite: Anth 400.

495.   DEVELOPMENTAL SOURCES OF ANTHROPOLOGICAL THEORY. 4 HOURS. Seminar on the sources relevant to the current and historical development of anthropological theory primarily as they derive from interaction among the subfields of anthropology but also as these influence, and are influenced by, other disciplines. Prerequisites: Anth 400; and 414, 430, or 450.

499.   THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Prerequisite: Consent of the instructor.

BIOENGINEERING

Professors: Irving F. Miller, Head of the Program; Gyan C. Agarwal, Edmund G. Anderson,* Robert C. Arzbaecher, Pietro O. Bramante,* Harold Feinberg,* Earl E. Gose, Ruy V. Lourenco,* John P. Marbarger,* Sabath F. Marotta,* Bruce H. McCormick, Akira Omachi,* William Rostoker, Albert B. Schultz, Bert L. Zuber

Associate Professors: Lyndon R. Babcock, Jr.,* Riad Barmada,* Badi M. Boulos,* Joseph C.F. Chow, Robert S. Pogrund*

Assistant Professors: Myron J. Evanich,* Gordon L. Humphrey,* Ike J.S. Hung (Visiting), Arthur J. Miller,* John L. Semmlow

*Principal appointment at the University of Illinois at the Medical Center.

    Work is offered leading to the Master of Science and the Doctor of Philosophy.
    Specialization in bioengineering trains the student to apply engineering concepts and methods to the life sciences and medicine. Areas covered include the application to living systems of the principles of information processing, communication, and control theory; cybernetics, artifical intelligence, and pattern recognition; bioinstrumentation, prostheses, and artifical organs; and some aspects of biophysics. This program is for graduates of life sciences, physical sciences, or engineering curricula. Students from the life sciences are expected to emphasize mathematics, engineering, and physical sciences in their initial course work; students from the physical sciences are expected to concentrate initially on the life sciences.

Admission Requirements

Master of Science

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study. In exceptional cases, students who have averages of less than 4.00 but above 3.50 or practicing engineers who wish to return to school for further graduate instruction may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Such students may be admitted on limited status and will be required to remedy department deficiencies before being admitted to regular status.

Doctor of Philosophy

The Doctor of Philosophy in Bioengineering is jointly administered by the College of Engineering of the University of Illinois at Chicago Circle and the University of Illinois at the Medical Center through the Intercampus Bioengineering Coordinating Committee. The purpose is to train people to do the research that will develop systems that apply modern technology to problems of living systems and health care.

Applicants for admission to the Doctor of Philosophy program must be highly motivated superior students. They must also meet the entrance requirements of the appropriate Graduate College (UICC or UIMC.) The program is designed primarily for students with degrees in physical sciences, engineering, mathematics, biology, or medicine. Students from other areas are also encouraged to apply if their backgrounds indicate a reasonable chance of success in the program.

Submission of Graduate Record Examination scores (the verbal and quantitative test as well as the advanced test in the applicant's undergraduate field) is required but may be waived under special circumstances.

Since students will be entering the program from a wide variety of disciplines, many will have deficiencies in a number of important areas. To remove any deficiencies in prerequisites or background requirements, the student may be required to take undergraduate or specialized remedial courses, chosen in consultation with his adviser.

Degree Requirements

Master of Science

1. A minimum of 48 quarter hours of graduate credit is required for graduation.
2. A grade point average of at least 4.00 is required for the Master of Science. Credit is not given for a course in which the grade is lower than C.
3. A student admitted to the MS program in bioengineering is assigned a program adviser, who consults with him in the selection of his elective courses. Progress toward completing the degree requirements for the

MS in Bioengineering is recorded only with the approval of the student's adviser.

4. A student who enters the MS program in bioengineering must be continuously registered for a minimum of 2 hours each quarter in any three quarters out of the calendar year between the time he enters the program and the time he receives his MS.

5. Required courses:
   Biological Sciences 363, 364—Animal Physiology I and II (or the equivalent), 10 hours.
   Bioengineering 497—Colloquium in Bioengineering, 1 hour.
   At least 16 quarter hours of 400-level courses must be taken, including at least 8 hours of 400-level courses in bioengineering.

6. Students are required to write an acceptable MS thesis. Bioengineering 499—Thesis Research must be taken for a minimum of 8 quarter hours.

Doctor of Philosophy

The PhD program in bioengineering requires 144 quarter hours of credit beyond the baccalaureate, consisting of a reasonable distribution of course work between UICC and UIMC. Of this total, at least 32 quarter hours must consist of 400-level courses and an additional 48 quarter hours of thesis research. A student who enters the program with an MS may be allowed to transfer up to 48 quarter hours of credit toward the degree. Specific course requirements for students entering with the MS may be waived if the student can demonstrate equivalent background.

The four areas of concentration:
1. Health Care Delivery
2. Medical Instrumentation
3. Physiological Systems and Biocontrol
4. Prosthetics and Artifical Organs

The student must complete, in one of these areas, at least 36 quarter hours of required courses and electives chosen in consultation with his adviser. In addition to these areas of concentration, a candidate with other interests may design his own area of concentration in consultation with his adviser, subject to approval by the candidate's doctoral advisory committee.

These courses are required of all students:

At UIMC:	
Physiology 369, 370, 371—Human Physiology	15 hours
At UICC:	
Bioengineering 490—Internship	6-12 hours
Bioengineering 354, 379, and 497	9 hours
Total	30-36 hours

A qualifying interview, held after the student completes 24 quarter hours and before he completes 36, determines the depth of the student's previous academic experience. Near the completion of his formal course work, the student submits a thesis proposal for faculty approval. At that time, the student also takes a preliminary examination to determine the depth of his knowledge in one of the broad academic areas covered by this program. When he successfully passes the preliminary examination, the student is expected to

continue and to intensify the research leading to the doctoral thesis. Finally, upon completion of the thesis the student is examined by a faculty committee appointed by the Intercampus Coordinating Committee.

Courses for Graduate and Advanced Undergraduate Students

Note: Many courses pertinent to the graduate program in bioengineering are offered by other UICC engineering departments and at UIMC. Students should consult the appropriate listings and call or write the Bioengineering Program for details.

341. MAN-MACHINE SYSTEMS. 4 HOURS. Same as Systems Engineering 341. Specific system areas in which the role of man in the system operation requires a systematic analysis of the human component in the system. Critical concepts, variables, and techniques involved in optimum design of human operated systems. Laboratory experiments on man-machine interactions. Prerequisite: SysE 315.

352. BIOCONTROL. 3 HOURS. Same as Information Engineering 352. Applicability of control systems theory to physiological systems, including the pupil system and eye and hand movement systems, utilizing such techniques as Fourier analysis, Nyquist stability criteria, and cross-correlation. Prerequisites: InfE 311 and 383 or 384.

353. BIOCONTROL LABORATORY. 3 HOURS. Same as Information Engineering 353. Experimental counterpart of Bioengineering 352. Motor coordination, crayfish photoreceptor, human pupil, eye movement. Prerequisite: Credit or registration in BioE 352.

359. NEUROANATOMY. 5 HOURS. Same as Biological Sciences 359 and Information Engineering 359. Introduction to the neurological organization of the mammalian central nervous system. Prerequisites: BioS 280 and consent of the instructor.

391. SEMINAR. 1 TO 4 HOURS. May be repeated for additional credit. Topics to be arranged. Prerequisite: Consent of the instructor.

393. SPECIAL PROBLEMS. 2 TO 4 HOURS. May be repeated for additional credit. Special problems or readings by arrangement with the faculty. Prerequisites: Senior standing and consent of the instructor.

396. SENIOR DESIGN I. 4 HOURS. Same as Energy Engineering 396, Information Engineering 396, Materials Engineering 396, and Systems Engineering 396. Introduction to engineering economics, legal and social constraints on design, safety and reliability theory, and the use of simulation and optimization techniques in the engineering design process. Prerequisites: Senior standing and completion of all core requirements in the College of Engineering.

397. SENIOR DESIGN II. 4 HOURS. Same as Energy Engineering 397, Information Engineering 397, Materials Engineering 397, and Systems Engineering 397. Application of principles of engineering and engineering design methodology to the solution of a large-scale design problem. May be taken in any department, regardless of area of concentration. Prerequisite: BioE 396.

Courses for Graduate Students

451. ADVANCED BIOCONTROL. Same as Information Engineering 451. Mathematical modeling and analysis of biological systems, emphasizing techniques of control engineering. Laboratory experiments on control systems of pupil eye movement and sensory motor coordination. Prerequisite: BioE 353.

490. INTERNSHIP IN BIOENGINEERING. 1 TO 4 HOURS. May be repeated. A minimum of 6 hours is required of all doctoral students. Current clinical practice experience in a health care setting culminating in a written and oral report. Prerequisites: Physiology 371 (Medical Center) or the equivalent, BioE 354, and consent of the instructor.

493. INDIVIDUAL RESEARCH. 2 TO 8 HOURS. Research on special problems not included in thesis research. Prerequisite: Consent of the instructor.

497. COLLOQUIUM ON BIOENGINEERING. 0 TO 1 HOUR. Recent innovations in bioengineering theory and practice presented by invited speakers, faculty, and doctoral students. All doctoral students in the program are required to attend during every quarter of their residence and make at least one presentation.

498. SEMINAR ON BIOENGINEERING. 1 TO 4 HOURS. Systematic review of special topics; emphasis on current research. Prerequisite: Consent of the instructor.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for a maximum of 16 hours of credit. Research on thesis topic. Prerequisites: Consent of the instructor and approval of the research prospectus by the thesis supervisor.

BIOLOGICAL SCIENCES

Professors: Elmer B. Hadley, Head of the Department; G. Benjamin Bouck, Donald A. Eggert, Sidney F. Glassman, Bernard Greenberg, Helene N. Guttman, Stanley K. Shapiro, Rolf Singer (Visiting), Eliot B. Spiess

Associate Professors: Louise Anderson, David Bardack, James A. Bond, Howard E. Buhse, Jr., Shepley S.C. Chen, Michael R. Cummings, M.A.Q. Khan, David B. Mertz, Darrel L. Murray, John A. Nicolette, Thomas Poulson, Jack H. Prost, Robert B. Willey, Ruth L. Willey

Assistant Professors: Dennis Bramble, Merrill Gassman, Marion Hulett, Gary Hyatt, John F. Lussenhop, William A. Mego, Dallice I. Mills, Donald Morrison, Dennis Nyberg, David G. Penney, A. Spencer Tomb, Heman J. Witmer

Adjunct Professors: Douglas Grahn (Argonne National Laboratory), Marion T. Hall (Morton Arboretum), Robert F. Inger (Field Museum of Natural History), Bernard N. Jaroslow (Argonne National Laboratory), Jerry R. Kline (Argonne National Laboratory), Herbert E. Kubitschek (Argonne National Laboratory), Carl Peraino (Argonne National Laboratory), Fritz Schlenk (Argonne National Laboratory), Warren K. Sinclair (Argonne National Laboratory), John F. Thomson (Argonne National Laboratory)

The Department of Biological Sciences offers work leading to the Master of Science in Biology and, in an intercampus program with the School of Life Sciences at the Urbana-Champaign campus of the University of Illinois, work leading to the Doctor of Philosophy in Biology.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university, a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study, and at least 30 quarter hours in biological sciences, excluding 100-level (introductory) courses, that indicate a broad, well-balanced selection of courses in biology. In exceptional cases, students who have averages of less than 4.00 but above 3.75 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Such students may be admitted on limited status and will be required to remedy department deficiencies before being admitted to regular status.

Applicants who have majored in fields other than biological sciences are encouraged to consult the department prior to making formal application for admission.

All students who apply for admission must submit the following:

A complete application form.

Complete transcripts of undergraduate (and any graduate) course work.

Three letters of recommendation, preferably from professors who are familiar with the student's recent work.

A statement of about 250 words presenting the applicant's reasons for desiring to take graduate work in biological sciences and the relationship of this work to his professional and other goals.

Graduate Record Examination scores for both the aptitude test and the advanced test in his major field.

Degree Requirements

Master of Science

When a student is admitted to the master's program, a temporary faculty adviser is appointed by the director of graduate studies in consultation with the student. Within the first two weeks of his first quarter an introductory

interview is held by an interview committee individually appointed for each student. This committee, consisting of three faculty members, one of whom is the student's temporary faculty adviser, represents at least three of the following four general areas:

1. Genetics, including evolutionary biology.
2. Cell physiology and biochemistry.
3. Organismic structure, function, and development.
4. Environmental and population biology.

The committee reviews the student's credentials, assesses his academic interests, and, together with the student, plans his course work. Academic deficiencies revealed by the interview should be eliminated as quickly as possible.

Candidates for the master's degree must complete 48 hours of graduate-level courses, of which at least 18 hours must be in 400-level courses. The student may elect one of two options: the first emphasizes independent research and is designed for those who may proceed toward the doctorate; the second is for the student whose prime interest lies in teaching and education.

For either of these options the student selects an area of concentration within the biological sciences and, in consultation with the director of graduate studies, chooses a principal adviser no later than the end of the second quarter. By the end of the third quarter in residence an advisory committee, whose function is to oversee the student's academic progress, will be appointed by the Dean of the Graduate College on the recommendation of the principal adviser and the graduate program committee. The composition of this committee is described under each of the options.

Option 1

The advisory committee consists of the principal adviser and at least two other faculty members from disciplines pertinent to the student's research interest. A final examination, to be taken after all course work and the thesis are completed, is conducted by the student's advisory committee and covers his thesis research and the subject matter from the biological sciences disciplines related to his area of specialization.

A maximum of 16 quarter hours in Biological Sciences 499—Thesis Research may be credited toward the degree.

Option 2

The advisory committee consists of the principal adviser, who is a specialist in biological sciences education, and at least two other faculty members from disciplines pertinent to the student's area of concentration. The candidate must complete the following:

1. At least 8 hours of course work in his area of concentration selected in consultation with his advisory committee.
2. At least 8 hours of Biological Sciences 493 in the form of an extended laboratory research project (a thesis is not required).
3. A minimum of 12 hours of course work in biological sciences education, including Biological Sciences 403.

Additional courses should be selected by the student, in consultation with his committee, to provide a broad biological sciences background. The student who elects Option 2 takes a final examination covering his general knowledge of biology, his specific area of biological sciences concentration, and the mechanisms of communicating biological sciences concepts.

Courses for Graduate and Advanced Undergraduate Students

300. SEMINAR. 0 TO 1 HOUR. Faculty and visiting biologists discuss results of their research programs before staff and students at weekly meetings. Attendance of majors at all meetings is strongly encouraged. Prerequisites: Biological sciences major and junior standing.

303. QUANTITATIVE BIOLOGY I. 5 HOURS. Quantitative ideas and mathematical models in the development of biological theory and as a basis for biological experimentation. Lecture and laboratory. Prerequisites: Math 131 and either BioS 240, 241 or BioS 315.

304. CYTOLOGY LABORATORY. 3 HOURS. Advanced cytology; emphasis on instrumental methods. Prerequisites: BioS 261 and concurrent registration in BioS 309.

305. QUANTITATIVE BIOLOGY II. 5 HOURS. Formal aspects of biological experimentation, including the basic aspects of experimental design; interpretation of biological data. Lecture and laboratory. Prerequisite: BioS 303.

307. BIOLOGICAL METHODS FOR TEACHERS. 3 HOURS. Investigation of methodological subject matter, conducted primarily as a practicum; emphasis on the development of competencies. Prerequisites: Senior standing and 40 hours of biological sciences.

309. CYTOLOGY. 3 HOURS. Structure and function of cells as revealed through historical development and modern research techniques. Lecture. Prerequisite: Two years of biological sciences.

313. DEVELOPMENTAL BIOLOGY. 4 HOURS. Principles governing growth and differentiation at molecular, fine structural, cellular, and organismic levels. Lecture and laboratory. Prerequisite: One year of biological sciences.

314. PLANT DEVELOPMENT. 5 HOURS. Analysis of growth in plants; modern concepts of cellular differentiation; control of plant development by intrinsic, hormonal, and environmental factors. Lecture and laboratory. Prerequisites: Chem 234, BioS 232, 313, or 333, and consent of the instructor.

315. PRINCIPLES OF ECOLOGY. 3 HOURS. Composition and distribution of biotic communities, plant and animal; emphasis on the

interplay of physical and biological factors of the environment. Prerequisites: One year of biological sciences and concurrent registration in BioS 324 or 380.

316.   INVERTEBRATE PALEONTOLOGY. 4 HOURS. Same as Geological Sciences 316. Phylogeny, morphology, and ecology of the fossil invertebrates. Prerequisites: BioS 218 and consent of the instructor.

317.   COMMUNITY ECOLOGY. 5 HOURS. Concepts of trophic structure, niche, competition, coexistence, and diversity are used to examine theories of community origin, change, structural-functional patterns, and distribution; emphasis on experimental bases and current problems. Prerequisites: BioS 315 and either 324 or 380.

318.   VERTEBRATE PALEONTOLOGY. 4 HOURS. Same as Geological Sciences 318. Phylogeny, morphology, and ecology of the fossil vertebrates. Prerequisites: BioS 281 and consent of the instructor.

319.   PALEOBOTANY. 5 HOURS. Same as Geological Sciences 319. Structure, phylogeny, and stratigraphic distribution of representative fossil plants. Lecture, laboratory, and field trips. Prerequisite: One year of biological sciences.

320.   FIELD BOTANY. 5 HOURS. Flora of the Chicago region. Lecture, laboratory, field trips. Prerequisite: One year of biological sciences.

321.   PLANT GEOGRAPHY OF NORTH AMERICA. 4 HOURS. Ecological and systematic treatment of vegetation regions and principal subdivisions; emphasis on environmental factors and floras. Prerequisite: BioS 220 or 315.

322.   ADVANCED TAXONOMY OF FLOWERING PLANTS. 4 HOURS. Emphasis on theories and data for evolution within groups of flowering plants. Prerequisite: BioS 220 or 345.

324.   PLANT ECOLOGY LABORATORY. 2 HOURS. Special attention to vegetation and environment of the Chicago region. Laboratory and field trips (one weekend trip, plus field trips on Saturdays in the fall, Sundays in the spring). Prerequisite: Concurrent registration in BioS 315.

325.   PLANT ANATOMY. 4 HOURS. Examination of the internal structure of vascular plants; emphasis on structure and function. Lecture and laboratory. Prerequisite: One year of college biology or the equivalent.

326.   PLANT PHYSIOLOGY I. 3 HOURS. Structure and function of the plant cell; emphasis on membrane function, water relations, solute translocation, and photosynthesis. Prerequisites: One year of biological sciences and Chem 234.

327. PLANT PHYSIOLOGY II. 3 HOURS. Physiology of plant growth and development; photomorphogenesis and photoperiodism, flowering, and phytohomones. Prerequisites: One year of biological sciences and Chem 234.

328. PLANT PHYSIOLOGY LABORATORY I. 2 HOURS. Laboratory techniques. Prerequisite: Concurrent registration in BioS 326.

329. PLANT PHYSIOLOGY LABORATORY II. 2 HOURS. Laboratory techniques. Prerequisite: Concurrent registration in BioS 327.

330. PRIMATE EVOLUTION. 4 HOURS. Same as Anthropology 330. Paleontology and systematics of fossil primates as illuminated by the anatomy, ecology, and behavior of the living populations. Prerequisite: Anth 231 or BioS 282 or 318.

331. HUMAN EVOLUTION. 4 HOURS. Same as Anthropology 331. Phylogeny of the primate order and the problems of speciation; particular emphasis on the relative roles of culture and nature as selective forces in human evolution. Prerequisite: Anth 231 or BioS 282 or 318.

332. MORPHOGENESIS IN HIGHER PLANTS. 3 HOURS. Morphogenesis, growth, and differentiation of vascular plants and bryophytes. Emphasis on experimental approaches to plant development at the molecular, cellular, and organismic levels. Lecture. Prerequisites: Senior standing, Chem 234, and BioS 331 or 333.

333. MORPHOLOGY OF VASCULAR PLANTS. 5 HOURS. Structure, reproduction, and evolutionary history of representative vascular plants, including psilopsids, lycopsids, sphenopsids, ferns, gymnosperms, and angiosperms. Lecture and laboratory. Prerequisite: One year of biological sciences.

334. EXPERIMENTAL PHYCOLOGY. 3 HOURS. Survey of major algal groups; particular emphasis on the use of algae as experimental organisms. Prerequisites: BioS 100, 101, 102, BioS 261 or 361 or the equivalent.

335. LABORATORY IN EXPERIMENTAL PHYCOLOGY. 2 HOURS. Field experience in collecting and identifying common algal forms; practical experience in the use of algae as experimental organisms. May be taken concurrently with Biological Sciences 334.

342. CYTOGENETICS. 4 HOURS. Chromosomal phenomena involved in the mechanics of genetics, structure of genetic material, and the role chromosomal variation plays in the evolution of races and species. Lecture and laboratory. Prerequisites: BioS 240, 241.

343.   POPULATION GENETICS. 3 HOURS. Genetic dynamics for animal, plant, and human populations: mating systems, selection, sampling, and mutation. Lecture and recitation. Prerequisites: BioS 240, 241, Math 130, and credit or concurrent registration in statistics.

344.   EXPERIMENTAL   POPULATION   GENETICS.   5   HOURS. Experimental and field empirical studies estimating genetic parameters, influence of selection, and other evolutionary forces on genotypes in populations. Lecture, laboratory, and discussion. Prerequisite: BioS 343.

345.   EVOLUTION. 4 HOURS. Mechanisms of genetic and phenotypic stability and change in populations and species; modes of speciation; rationale for classification systems; nature of taxonomic characters. Prerequisites: One year of biological sciences and BioS 240, 241.

347.   PHYSIOLOGICAL GENETICS. 4 HOURS. Consideration of heredity at the biochemical level; particular reference to mutation, the transcription and translation of genetic information, and genetic mechanisms. Lecture. Prerequisites: BioS 240, 241, 370.

349.   EVOLUTIONARY THEORY. 3 HOURS. Analysis of evolutionary mechanisms in plants and animals; variation and differentiation in population and species; origins of superspecific taxa. Prerequisites: BioS 315, 345.

350.   ADVANCED MICROBIOLOGY. 5 HOURS. Modern contributions to the cellular anatomy, physiology, and genetics of microorganisms. Lecture and laboratory. Prerequisite: BioS 250 or 261 or the equivalent.

351.   PRINCIPLES OF CELL AND TISSUE CULTURE. 5 HOURS. Methods for primary isolation of plant and animal tissue and subsequent cultivation. Uses of cells in culture as experimental tools. Prerequisites: BioS 250, 261.

353.   CHEMICAL BIOGENESIS. 4 HOURS. Same as Chemistry 353. Biosynthesis of important biological compounds. Lecture and discussion. Prerequisite: Chem 235.

356.   MYCOLOGY. 4 HOURS. Analysis of the morphology, physiology, and genetics of fungi as related to the taxonomy and phylogeny of fungi. Lecture and laboratory. Prerequisite: One year of biological sciences.

359.   NEUROANATOMY. 5 HOURS. Same as Bioengineering 359 and Information Engineering 359. Introduction to the neurological organization of the mammalian central nervous system. Prerequisites: BioS 280 and consent of the instructor.

361. CELL PHYSIOLOGY II. 3 HOURS. Emphasizes the structure and functional interactions of cell organelles. Organelle development, physiology, and organization are considered particularly in the context of current literature. Prerequisite: BioS 261 or the equivalent.

362. LABORATORY IN CELL PHYSIOLOGY II. 2 HOURS. Practical experience with techniques and analytical methods in cell physiology at an advanced level. An experimental approach is emphasized. Prerequisite: BioS 261 or the equivalent.

363. ANIMAL PHYSIOLOGY I. 5 HOURS. The role of the digestive, circulatory, respiratory, and osmoexcretory systems in the maintenance of organismic homeostasis. Emphasis on vertebrates. Lecture and laboratory. Prerequisite: BioS 261.

364. ANIMAL PHYSIOLOGY II. 5 HOURS. The role of the muscular, sensory, nervous, and endocrine systems in the maintenance of organismic integration. Emphasis on vertebrates. Lecture and laboratory. Prerequisite: BioS 261.

366. MICROBIAL PHYSIOLOGY I. 5 HOURS. Organization of physiological processes in various groups of microorganisms: comparative biochemistry of energy-yielding mechanisms; biosynthesis of macromolecules; ecological implications of microbial metabolism. Lecture, discussion, laboratory. Prerequisite: BioS 250 or the equivalent.

368. VIROLOGY. 4 HOURS. Nature of viruses and their morphology, chemical composition, assay, host-parasite interactions, and life cycles. Lecture, discussion. Prerequisite: BioS 250 or 261.

370. BIOCHEMISTRY I. 4 HOURS. Same as Chemistry 350. Chemistry of biological systems, including proteins and enzymes. Prerequisites: Chem 119 or 121 and credit or registration in Chem 235.

371. BIOCHEMISTRY II. 4 HOURS. Same as Chemistry 351. Continues Biological Sciences 370. Carbohydrate and lipide metabolism. Electron transport. Prerequisite: BioS 370.

372. BIOCHEMISTRY III. 4 HOURS. Same as Chemistry 352. Continues Biological Sciences 371. Metabolism of amino acids, nucleic acids, proteins, and the biosynthesis of biological macromolecules. Prerequisite: BioS 371.

373. BIOCHEMISTRY III LABORATORY. 2 HOURS. Experiments in macromolecular biochemistry, including cell fractionation, enzyme regulation, use of radioactive isotopes, and protein synthesis. Prerequisite: Concurrent registration in BioS 372 or Chem 352.

375. COMPARATIVE VERTEBRATE PHYSIOLOGY I. 4 HOURS. Comparison of selected physiological adaptations of various vertebrate

groups to the factors of the environment at the whole animal and organ systems levels. Lecture and laboratory. Prerequisite: BioS 275 or BioS 363 and 364 or the equivalent.

377. ENDOCRINOLOGY. 5 HOURS. Animal hormones in the control of integration, homeostasis, growth, and development. Lecture and laboratory. Prerequisite: BioS 364.

380. ANIMAL ECOLOGY LABORATORY. 2 HOURS. Population and community assemblages of the Chicago region. Laboratory and field trips are required (one weekend trip plus field trips on Saturdays in the fall, Sundays in the spring). Prerequisite: Concurrent registration in BioS 315.

382. ENVIRONMENTAL CONSERVATION. 4 HOURS. Applied ecology of the use of renewable natural resources; special emphasis on biotic problems of land, water, and air management; pollution, population increase, multiple-use concept, and land ethics. Lecture, discussion, and term paper. Prerequisite: Credit or concurrent registration in BioS 315 and either 324 or 380.

384. INVERTEBRATE PROTOSTOMES. 5 HOURS. Comparative study of structure, development, behavior, classification, and evolution of the annelid-arthropod line of invertebrates; emphasis on parasitism. Lecture and laboratory. Prerequisite: One year of biological sciences.

385. INVERTEBRATE RADIATA AND DEUTEROSTOMES. 5 HOURS. Comparative study of structure, development, classification, and evolution of the radiate and chordate lines of invertebrates; emphasis on colonial specialization. Lecture, laboratory, and research topic. Prerequisite: BioS 384.

388. GENERAL ENTOMOLOGY. 5 HOURS. Introduction to the morphology, physiology, classification, behavior, and evolution of insects. It is recommended that students planning to take this course begin collecting insects the previous spring and summer. Lecture and laboratory. Prerequisite: 12 hours of biological sciences.

389. PRINCIPLES OF PROTOZOOLOGY. 5 HOURS. Introduction to the comparative morphology, physiology, and systematics of the protozoa, including discussion of advances in major areas of current research. Lecture and laboratory. Prerequisite: One year of biological sciences.

392. FUNCTIONAL AND EVOLUTIONARY VERTEBRATE MORPHOLOGY. 5 HOURS. Functional analysis of vertebrate structure and development within an evolutionary framework. Introduction to analytical and experimental techniques in vertebrate morphology, such as biomechanics and high-speed cinematography. Prerequisite: BioS 280.

393. FUNCTIONAL ANIMAL MORPHOLOGY. 4 HOURS. Functional analysis of selected invertebrate and vertebrate organ systems applied to problems of comparative structure, adaptation, and phylogeny. Lecture and laboratory. Prerequisites: Senior standing and consent of the instructor.

395. BIOGEOGRAPHY. 3 HOURS. Geological and biological factors leading to past and present distribution patterns of animals; emphasis on current experimental methods to elucidate mechanisms of origin and diversification of island and continental faunas. Prerequisite: Senior standing.

397. ICHTHYOLOGY AND HERPETOLOGY. 5 HOURS. Ecology, speciation, and adaptive modification of fishes, amphibians, and reptiles as demonstrated from experimental and descriptive studies. Prerequisite: Any one of BioS 218, 240-241, 280, 281.

Courses for Graduate Students

401. FOUNDATIONS OF BIOLOGICAL THOUGHT. 4 HOURS. Presentation and analysis of some of the fundamental concepts of the mainstreams of biological thought.

402. PATTERNS OF BIOLOGICAL ENQUIRY. 4 HOURS. Contemporary and developing ideas in biology, utilizing blocks of integrated research papers to analyze the functioning of selected ideas as they influence the design, execution, and interpretation of research problems. Prerequisite: BioS 401.

403. ENQUIRY PROCESSES IN THE CLASSROOM. 4 HOURS. The insights derived from Biological Sciences 401 and 402 are used in preparing inquiry-oriented materials for presentation in the classroom. Prerequisite: BioS 402.

404. METHODS IN CELLULAR PHYSIOLOGY. 5 HOURS. May be repeated once for credit with the consent of the instructor. Analytical techniques and instrumentation used in microbiology, cell biology, and physiology. Practical and theoretical problems associated with these techniques. Prerequisites: BioS 261, 262, and 372 or the equivalents. Concurrent registration is allowed in BioS 372.

406. BIOLOGICAL ULTRASTRUCTURE. 5 HOURS. Discussion, instrumentation, and special topics in fine structure of plant and animal cells and cell products. Prerequisites: BioS 261, 309, organic chemistry, and consent of the instructor.

408. HISTOCHEMISTRY. 5 HOURS. Analysis of cell and tissue structure by histochemical methods. Prerequisites: BioS 261, 309, Chem 234, and consent of the instructor.

409.   COMPUTER-BASED EDUCATION FOR LIFE SCIENTISTS I. 2 HOURS. Current hardware, programming language, and lesson materials for teaching college and university biological sciences. Design, evaluation, and development of computer-based teaching modules. Lecture and discussion; use of PLATO IV. Prerequisite: Consent of the instructor.

410.   COMPUTER-BASED EDUCATION FOR LIFE SCIENTISTS II. 3 HOURS. Hands-on laboratory experience with the PLATO IV computer-based education system in student and author modes. Discussion and laboratory. Prerequisites: Consent of the instructor and concurrent registration in BioS 409.

411.   DISCUSSIONS IN PALEOBIOLOGY. 1 HOUR. May be repeated for credit. Selected topics and current research literature. Prerequisite: Consent of the instructor.

413.   PROBLEMS IN EVOLUTIONARY PALEONTOLOGY. 4 HOURS. Same as Geological Sciences 413. Seminar on current problems. Discussion of evidence and mechanisms of change, such as rates of evolution, population structure, and extinction as shown by the vertebrate fossil record. Prerequisite: Consent of the instructor.

415.   PRINCIPLES OF MORPHOGENESIS. 4 HOURS. Analysis of factors controlling growth and differentiation in unicellular and multicellular organisms. Prerequisites: BioS 240, 241, 313.

416.   EVOLUTION OF PTERIDOPHYTES. 4 HOURS. Basic structure and major features of evolution of lycopods, sphenopsids, and ferns. Prerequisites: BioS 333 or the equivalent and consent of the instructor.

417.   EVOLUTION OF GYMNOSPERMS. 4 HOURS. Basic structure and major features of evolution of naked seeded plants. Prerequisites: BioS 333 or the equivalent and consent of the instructor.

418.   ANGIOSPERM MORPHOLOGY. 4 HOURS. Basic structure and major features of evolution within the flowering plants. Prerequisites: BioS 333 or the equivalent and consent of the instructor.

419.   TOPICS IN THE MORPHOLOGY AND EVOLUTION OF PLANTS. 1 HOUR. Seminar. Prerequisites: BioS 333 or the equivalent; BioS 416, 417, or 418; and consent of the instructor.

420.   ADVANCED VERTEBRATE PALEONTOLOGY. 4 HOURS. May be repeated twice for credit. Same as Geological Sciences 420. Given as three different courses. Advanced treatment of the functional morphology, paleocology, and phylogeny of the various vertebrate groups: fishes, amphibians and reptiles, and mammals. Prerequisites: BioS 282, 318.

422. PHYSIOLOGICAL ECOLOGY OF PLANTS. 4 HOURS. Physiological investigation of climatic and edaphic differentiation; emphasis on the ecophysiological adaptations of species to their environments. Prerequisites: BioS 315, 324, or 380, and one quarter of plant physiology.

423. DISCUSSIONS IN ECOLOGY AND BEHAVIOR. 2 HOURS. May be repeated for up to 8 hours of credit. Selected topics, current literature, and recent advances. Prerequisite: Consent of the instructor.

424. ADVANCED PALEOBOTANY. 4 HOURS. Problems in the structure and phylogeny of representative fossil plant groups. Lecture, laboratory, occasional field trip. Prerequisite: BioS 319.

426. BIOCHEMICAL SYSTEMATICS. 4 HOURS. Analysis of the utilization of comparative biochemical data in determining evolutionary relationships among groups of plants and animals. Prerequisites: BioS 345, 353.

428. INTERMEDIARY METABOLISM IN PLANTS. 3 HOURS. Pathways of carbon metabolism, enzymes involved, and control mechanisms. Prerequisite: BioS 329 or Chem 351.

429. TOPICS IN SYSTEMATIC BOTANY. 4 HOURS. Specialized systematic studies of the larger, more important families of flowering plants. Lecture, laboratory, and field trips. Prerequisite: BioS 220 or 315 or 345.

430. POPULATION ECOLOGY. 3 HOURS. The ecology of plant and animal populations. Life histories and population growth, competition, predator-prey systems, population movement, and ecological genetics; emphasis on populational modeling. Prerequisites: BioS 240, 241, 315, 324 or 380, and consent of the instructor.

436. PHOTOBIOLOGY. 3 HOURS. Photobiological processes, including vision, photosynthesis, ultraviolet light as a mutagen, bioluminescence, phototropisms, and photomorphogenesis. Basic techniques in photobiological research. Prerequisites: BioS 328, 329, and consent of the instructor.

437. ORGANELLE BIOGENESIS. 3 HOURS. May be repeated once for credit. Organization, development, and reproduction of plastids and mitochondria, including growth, differentiation, continuity, genetics, and autonomy; origin and evolutionary significance of these organelles. Prerequisites: BioS 261, Chem 351 or the equivalent, and consent of the instructor.

438. EXPERIMENTAL PLANT SYSTEMATICS. 4 HOURS. Evolutionary mechanisms and pathways in higher plants; analysis of genetic chromosomal, morphological, and physiological properties of natural assemblages at and below the species level of divergence. Lecture and laboratory. Prerequisites: BioS 342, 349.

440.   SEMINAR ON GENETICS. 2 HOURS. May be repeated for credit. Discussion of research literature in the field. Student topics are assigned. Prerequisites: BioS 240, 241, and consent of the instructor.

442.   PROBLEMS IN POPULATION GENETICS. 3 HOURS. May be repeated for credit. Lecture and discussion of research literature in the field. Prerequisites: BioS 343, 344.

445.   DISCUSSION IN SYSTEMATICS AND EVOLUTION. 1 HOUR. May be repeated for credit. Current literature and recent advances in the field of systematic biology. Prerequisite: Consent of the instructor.

446.   DEVELOPMENTAL GENETICS. 4 HOURS. Principles of genome function during gametogenesis and the onset of differentiation; patterns and mechanisms of gene regulation in differentiated cells. Prerequisites: BioS 240, 241.

447.   THE REGULATION OF GENE EXPRESSION. 4 HOURS. Analysis of control of gene function at the molecular level; comparison of eucaryotic to procaryotic systems, positive and negative control at the transcriptional level, translational control, allosterism. Prerequisites: BioS 240, 372. Biological Sciences 347 is recommended.

450.   TOPICS IN MICROBIAL PHYSIOLOGY. 4 HOURS. Modern contributions to microbiology, including the ultrastructure of the bacterial cell, metabolism and control mechanisms, bacterial genetics, and cell-viral systems. Lecture and laboratory. Prerequisite: BioS 350.

451.   INSECT MICROBIOLOGY. 5 HOURS. Host-microbe associations and their commensal, pathogenic, and other interactions. Virus, protozoan, and bacterial associations. Prerequisites: BioS 250, 388.

452.   INSECT PHYSIOLOGY. 5 HOURS. Structure, function, and adaptive aspects of the insect exoskeleton and organ systems; growth, differentiation, and reproduction. Prerequisite: BioS 388.

455.   TOPICS IN MOLECULAR BIOLOGY. 3 HOURS. May be repeated for credit. Selected topics emphasizing molecular studies involved in such diverse areas as virology, genetics, immunology, photobiology, pharmacology, and exobiology. Prerequisites: BioS 240, 241, 250, 261, and consent of the instructor.

456.   BACTERIAL PHOTOSYNTHESIS. 3 HOURS. Structure and function of the photochemical apparatus in the photosynthetic bacteria; photosynthetic carbon, nitrogen, hydrogen, and sulfur metabolism in the bacteria. Prerequisites: BioS 250, 328, 329.

468.   MICROBIAL PHYSIOLOGY II. 4 HOURS. May be repeated for a total of 8 hours. Biochemistry of growth of microorganisms; formation of various microbial structures; biosynthesis of major cellular constituents; metabolic regulation; kinetics of microbial growth. Lecture, discussion, laboratory. Prerequisite: BioS 366.

471.   COMPARATIVE VERTEBRATE PHYSIOLOGY II. 4 HOURS. Comparison of selected physiological adaptations of various vertebrate groups to the factors of the environment at the tissue and cellular levels. Lecture and laboratory. Prerequisite: BioS 375 or an equivalent physiology course.

472.   EXPERIMENTAL ANIMAL PHYSIOLOGY. 4 HOURS. May be repeated once for credit. Selected topics in experimental surgery and pharmacodynamics. Prerequisite: BioS 363 or 364.

473.   COMPARATIVE INVERTEBRATE PHYSIOLOGY. 5 HOURS. Adaptive mechanisms of invertebrate animals in their major kinds of habitats. Lecture and laboratory. Prerequisite: BioS 385.

486.   ADVANCED INVERTEBRATE ZOOLOGY. 5 HOURS. May be repeated for credit with the consent of the instructor. Selected topics in currently advancing areas of descriptive and experimental invertebrate zoology. Emphasis on recent comparative research in such areas as behavior, embryogenesis, circadian rhythms, and ecological interactions. Lecture, laboratory, directed laboratory or field research. Prerequisite: BioS 384 or 385.

489.   ADVANCED PROTOZOOLOGY. 4 HOURS. Selected topics in modern protozoological research. Prerequisite: BioS 389.

490.   PROBLEMS IN VERTEBRATE MORPHOLOGY. 4 HOURS. Feeding and locomotory mechanisms of selected vertebrates. Dissection, experimentation, and seminar presentation of analyzed results. Laboratory and discussion. Prerequisite: BioS 393 or the equivalent.

492.   SEMINARS ON BIOLOGY. 1 TO 3 HOURS. Credit varies according to the seminar offered. May be repeated for credit. Selected aspects of biological sciences.

493.   PROBLEMS IN MODERN BIOLOGY. 2 TO 8 HOURS. May be repeated for credit. Not to be used for thesis research. Guided study of selected topics with research potential in specific fields of advanced modern biology. Prerequisite: Consent of the instructor.

495.   GRADUATE SEMINAR. NO CREDIT. Thesis presentation by advanced students; occasional seminar by staff and invited speakers. Required of graduate students every quarter.

499.   THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Work in a number of fields offered under the direction of faculty members with appropriate graduate standing.

CHEMISTRY

Professors: William F. Sager, Head of the Department; Bernard J. Babler, Joseph H. Boyer, Thomas H. Brown, Richard L. Carlin, Melvyn R. Churchill, Charles K. Hunt, Jacques Kagan, Chui Fan Lui, Clifford N. Matthews, Robert M. Moriarty, Jan Rocek, Robert I. Walter

Associate Professors: Ronald J. Baumgarten, Richard P. Burns, Eric A. Gislason, David Gorenstein, Cynthia J. Jameson, J. Victor Mansfield, William L. Mock, Samuel Schrage

Assistant Professors: Benedict W. Bangerter, Anthony H. Francis, Wade A. Freeman, Richard J. Kassner, Florence C. Klee, Leonard Kotin, Pierre R. LeBreton, James N. McElearney, Robert N. Schwartz

Work is offered leading to the Master of Science, Doctor of Arts, and Doctor of Philosophy in inorganic, organic, physical, physical organic, and theoretical chemistry and in biochemistry.

Admission Requirements

Applicants are considered on an individual basis. Sufficient preparation normally requires completion of a course sequence leading to a bachelor's degree with a major in chemistry and a grade point average of at least 4.00 (A=5.00) in mathematics and science courses. Three letters of recommendation must also be submitted. In exceptional cases students who have averages of less than 4.00 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Potential applicants who have majored in fields other than chemistry must remedy deficiencies in their preparation before being granted full standing in the graduate program. Submission of Graduate Record Examination (GRE) scores (verbal and quantitative test and the advanced test in chemistry) is recommended. Persons who have completed their studies outside of the United States must also submit Test of English as a Foreign Language (TOEFL) scores.

Degree Requirements

Master of Science

Hours. 48 quarter hours, of which 32 must be within the Department of Chemistry. The remaining 16 hours may be selected from the offerings of other departments on the basis of their relevance to a particular area of interest. Course work in other departments will be strongly recommended when it is judged advisable for the student's best professional development. At least 16 quarter hours must be taken at the 400 level, of which 12 must be selected from the course offerings of the Department of Chemistry.

All MS candidates are required to participate in undergraduate teaching, which is assigned in individual cases according to background and interest. A minimum of 16 quarter hours is required.

Thesis. Optional; up to 18 quarter hours of thesis research may be credited, subject to the approval of the department.

Doctor of Arts

Hours. 144 quarter hours, including a required core program of 56 quarter hours, 24 quarter hours of Chemistry 499, 12 quarter hours of physics, biological sciences, or mathematics, and 48 to 52 additional quarter hours of formal course work in chemistry and other natural sciences selected in consultation with the department.

All Doctor of Arts candidates are required to participate in undergraduate teaching at the University for a minimum of 16 quarter hours.

Theses. Candidates must prepare one thesis based on the design and testing of a new educational aid and one based on original research carried out under the direction of a qualified member of the department, both subject to approval by an examining committee.

All candidates must meet the department foreign language requirement.

Prospective candidates may obtain detailed information from the Department of Chemistry.

Doctor of Philosophy

In addition to satisfying the general requirements of the Graduate College, students must pass the department cumulative examinations. Chemistry 404, 405, 406, which provide a foundation for areas of specialization, are required of all students except when, in consultation with the department head, alternative course sequences are determined to be more suitable to a candidate's individual needs. All other formal course work is determined, with the advice of the department, according to its relevance to the student's field of interest.

Thesis. The candidate must prepare a thesis based upon original research carried out under the direction of a qualified member of the department and approved by an examination committee.

The candidate must also meet the department foreign language requirement.

Prospective candidates may obtain detailed information on all requirements by applying to the Department of Chemistry.

Courses for Graduate and Advanced Undergraduate Students

314.   INORGANIC CHEMISTRY. 4 HOURS. Lectures and assigned readings on the chemistry of selected elements. Prerequisite: Chem 340.

315.   INORGANIC CHEMISTRY. 4 HOURS. Lectures and assigned readings in structural inorganic chemistry, inorganic reaction mechanisms and techniques, and the nature of the coordinate bond. Prerequisite: Chem 342 or the equivalent.

316. INORGANIC CHEMISTRY LABORATORY. 2 HOURS. Synthesis of inorganic compounds illustrating the use of modern preparative techniques. Prerequisite: Credit or registration in Chem 315.

321. CHEMICAL AND INSTRUMENTAL ANALYSIS I. 5 HOURS. Methods of analysis and their application to the quantitative study of chemical reactions. Prerequisites: Chem 235 and credit or registration in Chem 343 or the equivalents.

322. CHEMICAL AND INSTRUMENTAL ANALYSIS II. 3 HOURS. Continues Chemistry 321. Prerequisite: Chem 321.

327. APPLIED ANALYTICAL CHEMISTRY I. 5 HOURS. Same as Criminal Justice 314. Theory and procedures of separation, purification, and identification of components of industrial and forensic interest. Prerequisites: Chem 121, 235 or CrJ 313.

328. APPLIED ANALYTICAL CHEMISTRY II. 5 HOURS. Same as Criminal Justice 315. Advanced instrumental analytical procedures applied to substances of industrial and forensic interest. Prerequisite: Chem 327.

338. SYSTEMATIC IDENTIFICATION OF ORGANIC COMPOUNDS. 3 HOURS. Primarily a laboratory course; chemical, physical, and spectroscopic methods are used to separate, purify, and identify organic compounds. Prerequisite: Chem 237.

339. ORGANIC SYNTHESIS. 2 TO 4 HOURS. Discussion and laboratory work involving special techniques. Prerequisite: Chem 237 or the equivalent.

340. PHYSICAL CHEMISTRY I. 4 HOURS. Credit is not given for both the Chemistry 340, 342, 344 sequence and the 380, 382 sequence. Introduction to chemical principles. Prerequisites: Chem 119 or 121, credit or registration in Math 133, and one year of college physics.

341. PHYSICAL CHEMISTRY LABORATORY I. 2 HOURS. Quantitative experimental study of chemical principles. Prerequisite: Concurrent registration in Chem 340.

342. PHYSICAL CHEMISTRY II. 4 HOURS. Continues Chemistry 340. Prerequisite: Chem 340.

343. PHYSICAL CHEMISTRY LABORATORY II. 2 HOURS. Continues Chemistry 341. Prerequisites: Chem 341 and concurrent registration in Chem 342.

344. PHYSICAL CHEMISTRY III. 4 HOURS. Continues Chemistry 342. Prerequisite: Chem 342.

345. PHYSICAL CHEMISTRY LABORATORY III. 2 HOURS. Continues Chemistry 343. Prerequisites: Chem 343 and concurrent registration in Chem 344.

347. INTRODUCTION TO QUANTUM CHEMISTRY. 4 HOURS. Applications of quantum mechanics to problems of chemical interest. Additional assignments are required. Prerequisite: Chem 344.

348. THERMODYNAMICS. 4 HOURS. Lectures and assigned readings; applications to chemical systems. Prerequisite: Chem 344.

349. STATISTICAL THERMODYNAMICS. 4 HOURS. Introduction to statistical mechanics and application to equilibrium thermodynamics. Prerequisite: Chem 344.

350. BIOCHEMISTRY I. 4 HOURS. Same as Biological Sciences 370. Chemistry of biological systems, including proteins and enzymes. Prerequisites: Chem 119 or 121 and credit or registration in Chem 235.

351. BIOCHEMISTRY II. 4 HOURS. Same as Biological Sciences 371. Continues Chemistry 350. Carbohydrate and lipide metabolism. Electron transport. Prerequisite: Chem 350.

352. BIOCHEMISTRY III. 4 HOURS. Same as Biological Sciences 372. Continues Chemistry 351. Metabolism of amino acids, nucleic acids, and proteins; the biosynthesis of biological macromolecules. Prerequisite: Chem 351.

353. CHEMICAL BIOGENESIS. 4 HOURS. Same as Biological Sciences 353. Biosynthesis of important biological compounds. Prerequisite: Chem 235.

355. BIOCHEMISTRY LABORATORY I. 2 HOURS. Introduction to experimentation with biochemical systems, processes, and compounds of biochemical importance. Prerequisites: Chem 121 and registration in Chem 350.

357. BIOCHEMISTRY LABORATORY II. 2 HOURS. Continues Chemistry 355. Prerequisites: Chem 355 and registration in Chem 351.

361. ADVANCED ORGANIC CHEMISTRY I. 4 HOURS. A physical-organic approach to organic reactions; particular emphasis on reaction mechanisms and the relationship between reactivity and structure. Lectures and assigned readings. Prerequisites: Chem 235, 344.

362. ADVANCED ORGANIC CHEMISTRY II. 4 HOURS. Continues Chemistry 362. Lectures and assigned readings. Prerequisite: Chem 361.

380.   PRINCIPLES OF PHYSICAL CHEMISTRY I. 3 HOURS. Credit is not
given for both the Chemistry 380, 382 sequence and the 340, 342, 344
sequence. Chemistry 380 and 382 provide an elementary introduction
to physical chemistry; particular emphasis on topics of importance in
the biological and health sciences. Prerequisites: Chem 119 or 121,
calculus, and two quarters of physics.

382.   PRINCIPLES OF PHYSICAL CHEMISTRY II. 4 HOURS. Continues
Chemistry 380. Prerequisite: Chem 380.

383.   ELEMENTARY PHYSICAL CHEMISTRY LABORATORY. 1 HOUR.
An introductory course. Prerequisite: Chem 380.

384.   SURFACE AND MACROMOLECULAR CHEMISTRY. 4 HOURS.
Interfacial phenomena, stability of disperse systems, properties of
polymer solutions. Prerequisites: Chem 382 or the equivalent and
consent of the instructor.

385.   SURFACE AND MACROMOLECULAR LABORATORY. 2 HOURS.
Techniques in surface and macromolecular chemistry. Prerequisites:
Credit or registration in Chem 384 and consent of the instructor.

392.   INDEPENDENT STUDY. 1 TO 4 HOURS. May be repeated for credit.
Individual study, under close supervision of a faculty member, in areas
not covered in standard courses. Credit is contingent on the submission
of a written report to both the supervisor for approval and the De-
partment of Chemistry for information. A maximum of 8 hours of
Chemistry 392 and 399 combined may be credited toward department
undergraduate-degree course requirements. Prerequisites: Approval of
the department and consent of the instructor.

393.   TOPICS IN MODERN CHEMISTRY. 2 TO 4 HOURS. Lectures, demon-
strations, and discussions in specialized areas of chemistry, including
analytical, inorganic, organic, and physical chemistry and bio-
chemistry. Prerequisite: Consent of the instructor.

399.   INDEPENDENT RESEARCH. 3 HOURS OR MORE. May be repeated
for credit. Individual research performed under the close supervision of
a faculty member. Credit is contingent on the submission of a written
report to both the supervisor for approval and the Department of
Chemistry for information. A maximum of 8 hours of Chemistry 392
and 399 combined may be credited toward department under-
graduate-degree course requirements. Prerequisites: Approval of the
department and consent of the instructor.

Courses for Graduate Students

404.   QUANTUM MECHANICS. 4 HOURS. Required of all PhD students in
chemistry. Exact solution of the Schroedinger equation for simple
systems; variational principle; approximation methods in complex
systems; effects of electric and magnetic fields.

405. MOLECULAR SPECTROSCOPY. 4 HOURS. Required of all PhD students in chemistry. Analysis and interpretation of molecular spectra, including electronic, vibrational, magnetic resonance, and Mossbauer spectra.

406. CHEMICAL APPLICATIONS OF GROUP THEORY. 4 HOURS. Required of all PhD students in chemistry. Introduction to the use of group-theoretical methods in the analysis of spectroscopic problems; ligand and field theory; molecular calculations.

410. CURRENT PROBLEMS IN INORGANIC CHEMISTRY. 2 HOURS. May be repeated for credit. Analysis of fundamental concepts as they appear in a modern research context.

412. SPECIAL TOPICS IN INORGANIC CHEMISTRY. 2 TO 5 HOURS. Lectures on topics not represented in regularly scheduled courses.

413. PHYSICAL METHODS OF INORGANIC CHEMISTRY. 4 HOURS. Application of physiochemical methods to problems in inorganic chemistry.

414. ADVANCED INORGANIC LABORATORY. 2 TO 4 HOURS. Experimental methods in synthesis and study of inorganic compounds.

415. COMPLEX INORGANIC COMPOUNDS. 4 HOURS. Stereochemistry, reactions, and theory of bonding of coordination compounds.

423. CATALYSIS IN ENZYMOLOGY. 4 HOURS. Application of physical organic chemistry to the understanding of enzyme action and the mechanisms of biochemical reactions. Prerequisites: Chem 351, 362.

425. BIOENERGETICS. 4 HOURS. Thermodynamic changes associated with the formation of chemical gradients, the transformation of metabolites, oxidation-reduction reactions, and the synthesis of macromolecules, including detailed consideration of mechanisms of oxidative and photophosphorylation. Prerequisites: Chem 344, 351.

431. LITERATURE SEMINAR ON ORGANIC CHEMISTRY. 1 HOUR. Presentation of student papers on current research topics; preparation and distribution of abstracts. Discussion is an integral part of the course.

432. SPECIAL TOPICS IN ORGANIC CHEMISTRY. 4 HOURS. Discussion of topics of current interest.

433. SPECIAL TOPICS IN REACTION MECHANISMS. Theory and techniques in specialized areas in reaction mechanisms. Prerequisite: Chem 362 or the equivalent.

434. PHYSICAL METHODS IN ORGANIC CHEMISTRY. 4 HOURS. Application of infrared, ultraviolet-visible, magnetic resonance, electron

spin resonance, and mass spectrometry and optical rotatory dispersion in organic chemistry. Prerequisite: Chem 405.

435.   ADVANCED ORGANIC SYNTHESIS. 4 HOURS. Discussion and laboratory work involving special techniques in organic synthesis. Prerequisite: Credit or registration in Chem 434.

436.   CHEMISTRY OF NATURAL PRODUCTS. 4 HOURS. Discussion of the more important groups of natural products, including their structure determination, synthesis, and biogenetical relationships. Offered alternate years. Prerequisite: Chem 235.

437.   SURVEY OF ORGANIC CHEMISTRY I. 4 HOURS. Topics on synthesis, mechanisms, and stereochemistry at an advanced level.

438.   SURVEY OF ORGANIC CHEMISTRY II. 4 HOURS. Continues Chemistry 437. Prerequisite: Chem 437.

439.   SURVEY OF ORGANIC CHEMISTRY III. 4 HOURS. Continues Chemistry 438. Prerequisite: Chem 438.

440.   CURRENT PROBLEMS IN PHYSICAL CHEMISTRY. 2 HOURS. May be repeated for credit. Analysis of fundamental concepts as they appear in a modern research context.

442.   SPECIAL TOPICS IN PHYSICAL CHEMISTRY. 2 TO 4 HOURS. Lectures and reading in areas not normally treated in standard courses. Discussions of topics of current interest.

443.   SPECIAL TOPICS IN CHEMICAL KINETICS. 2 TO 4 HOURS. Theory and techniques in specialized areas. Prerequisite: Chem 349 or the equivalent.

444.   STATISTICAL MECHANICS I. 4 HOURS. Statistical models of systems in thermodynamic equilibrium. Offered alternate years. Prerequisite: Chem 349.

445.   STATISTICAL MECHANICS II. 4 HOURS. Statistical models of the liquid state and nonequilibrium processes. Prerequisite: Chem 444.

446.   QUANTUM CHEMISTRY I. 4 HOURS. Treatment of complex atoms and molecular systems. Hartree-Foch calculations and other methods; interactions of radiation with matter. Prerequisite: Chem 406.

447.   QUANTUM CHEMISTRY II. 4 HOURS. Continues Chemistry 446. Prerequisite: Chem 446.

448.   QUANTUM CHEMISTRY III. 4 HOURS. Continues Chemistry 447. Prerequisite: Chem 447.

461.   SYNTHETIC METHODS OF ORGANIC CHEMISTRY I. 4 HOURS.
Discussion of methods used in organic synthesis; introduction and
modification of functional groups, methods of selective group pro-
tection, stereospecific processes, recent examples of applications.
Prerequisite: One year of organic chemistry.

462.   SYNTHETIC METHODS OF ORGANIC CHEMISTRY II. 4 HOURS.
Continues Chemistry 461. Prerequisite: Chem 461.

499.   THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit.
Prerequisite: Approval of the department.

CRIMINAL JUSTICE

Professors: James W. Osterburg, Head of the Department; James R. Carey,
Hans Mattick, Joseph Nicol

Associate Professors: Bernard Dolnick, Sidney Hyman, Patrick D. McAnany,
Michael D. Maltz, Marshall Patner (Visiting), Stephen A. Schiller, John A.
Webster

Assistant Professors: Sidney F. Bosen, Shari S. Diamond, Sanford M.
Sherizen, Larry L. Tifft

Lecturers: Broderick Reischl

The Department of Criminal Justice offers work leading to the Master of
Arts in Criminal Justice and the Master of Science in Criminalistics.

Admission Requirements

Applicants are considered on an individual basis.

1. All applicants must have a baccalaureate from an accredited institution.
2. Students applying for admission to the Master of Arts in Criminal Justice
    program should have a strong background in the social sciences (a
    minimum of 20 quarter hours in advanced courses) and a basic course in
    statistical methods. Students applying for admission to the Master of
    Science in Criminalistics program should have a strong background in the
    natural or physical sciences (a minimum of 20 quarter hours in advanced
    courses) and a basic course in statistical methods. Students with other
    backgrounds may petition for admission. Informational deficiencies, as
    determined by the department's Committee on Graduate Studies and the
    student's faculty adviser, must be made up early in the student's
    residence. No credit toward the degree is given for courses taken to
    remedy deficiencies.
3. The student's grade point average must meet the minimum Graduate
    College requirement.
4. Applicants must submit Graduate Record Examination scores on the
    verbal and quantitative aptitude test. If available, an advanced test related
    to the undergraduate major must be taken.

5. Three letters of recommendation are required, preferably from professors who are familiar with the student's recent work. If the applicant has been engaged for some time in professional work, letters from supervisors may be substituted.
6. A one-page statement must be submitted describing the applicant's reasons for desiring to take graduate work in criminal justice and the relationship of this work to his professional and other goals.
7. A department committee makes all admission decisions for the department.

Degree Requirements for the Master of Arts in Criminal Justice and the Master of Science in Criminalistics

The basic requirements for these degrees are identical except for the type of thesis or internship projects required and the elective and collateral courses recommended to fulfill the goals of the student.

Students must complete a minimum of 48 quarter hours of graduate work.

1. *Core Program.* All students must complete the core curriculum of 20 quarter hours:
    Criminal Justice 400—Systems Concepts, 4 hours
    Criminal Justice 410—Processes and Institutions, 4 hours
    Criminal Justice 470—Law and Its Byways, 4 hours
    Criminal Justice 480—Crime and Social Control, 4 hours
    Criminal Justice 490—Research Methodology, 4 hours

A student with extensive undergraduate work in core areas may, at the discretion of his adviser, substitute other 400-level courses of equal credit in the same substantive areas.

2. *Electives.* 8 quarter hours at the 400 level in criminal justice and in collateral fields.
3. *Research/Internship Option.* The student must complete at least one of the following options:
    a. Thesis
    b. Master's paper
    c. Internship

The *thesis* emphasizes research design, the collection and organization of data, and the integration of course materials. A thesis is appropriate for the student who is planning a research career or further graduate study. Within the first two quarters of residence, a student who elects this option should submit a thesis proposal for approval by the department Committee on Graduate Studies. From 12 to 16 quarter hours of credit for thesis research are allowed toward the degree.

The *master's paper* option is designed to demonstrate, in a paper of general scope, the student's ability to integrate knowledge in the field of criminal justice. It is appropriate for the student whose career interests lie either in teaching or in administration. From 6 to 10 quarter hours of credit are allowed toward the degree.

The *internship* option emphasizes the integration of course materials with learning experiences in a series of field internships among operating criminal justice agencies. It is appropriate for the student who wishes to teach, for the

student without experience in criminal justice, or for the student who wishes to broaden the base of his existing knowledge. An internship report is required, which must evaluate critically the internship experiences and demonstrate their integration with several areas of criminal justice. From 4 to 8 quarter hours of credit are allowed toward the degree.

The three options are not mutually exclusive. A student who elects the *thesis* option or the *master's paper* option may choose to participate in some field internship experience. Similarly, the student who elects the *master's paper* option or the *internship* option may decide to convert his master's paper or internship report into a thesis.

A candidate must pass a *comprehensive examination,* given at least once each quarter, by the end of his third quarter of full-time residence or the equivalent. The examination may be repeated once, within two quarters of full-time residence or the equivalent, if the first attempt is unsuccessful.

Courses for Graduate and Advanced Undergraduate Students

313. ADVANCED CRIMINALISTICS ANALYSIS LABORATORY. 5 HOURS. Continues Criminal Justice 211. More advanced concepts of identification and individualization, including the examination of less frequently encountered physical evidence materials, and empirical data requirements for interpretation of examinations. Prerequisites: CrJ 210, 211.

314. APPLIED ANALYTICAL CHEMISTRY I. 5 HOURS. Same as Chemistry 327. Theory and procedures of separation, purification, and identification of components of industrial and forensic interest. Prerequisites: Chem 121, 235 or CrJ 313.

315. APPLIED ANALYTICAL CHEMISTRY II. 5 HOURS. Same as Chemistry 328. Advanced instrumental analytical procedures applied to substances of industrial and forensic interest. Prerequisite: CrJ 314.

330. COMPLEX ORGANIZATIONS IN THE CRIMINAL JUSTICE SYSTEM. 4 HOURS. Exploration and analysis. Police departments, courts, and prison structure in context and mutual permeability with their environments. Special attention to research questions. Prerequisite: Junior standing.

333. SOCIOLOGY OF LAW. 4 HOURS. Same as Sociology 333. The origin and development of legal norms in various social settings; their relationship to custom and incorporation in legal and quasi-legal institutions; special attention to the difference between legal and sociological reasoning; law as an instrument of social change. Prerequisite: 8 hours of upper-division sociology, including CrJ 230.

335. ORGANIZED CRIME IN THE UNITED STATES. 4 HOURS. The development of organized crime throughout history; detailed consideration of the political, social, and economic conditions involved in the appearance, spread, and expansion of organized crime in America. Prerequisites: CrJ 101, 102.

339.   INSTITUTIONAL TREATMENT OF OFFENDERS. 4 HOURS. The role of custodial and correctional institutions in the treatment of the offender; philosophy of administration and management of institutions; survey of historical development and current trends in jails and prisons. Prerequisites: CrJ 101, 102.

340.   CRIMINAL SELF AND CRIMINAL CAREERS. 4 HOURS. The development of criminal self-conceptions; social-psychological processes of group alienation; development of commitment and professionalization in the development of criminal careers. Selected case studies. Prerequisites: Soc 100, CrJ 231.

345.   COMMUNITY TREATMENT OF OFFENDERS. 4 HOURS. The history and development of programs relating to community treatment of offenders; the philosophies and programs dealing with the rehabilitation and reintegration of the offender into society. Prerequisites: CrJ 101, 102, Soc 225, 276.

350.   THE ROLE OF LAW ENFORCEMENT IN COMMUNITY RELATIONS. 4 HOURS. Analysis of the relationship between law enforcement and the social structure of the community; the significant problem areas involving minority elements, cultural and ethnic groups, power and social-elite and political and social-action movements. Prerequisites: CrJ 101, 102, Soc 225 or 276.

351.   CRIMINAL LAW I: SUBSTANTIVE CRIMINAL LAW. 4 HOURS. Required in the criminal justice curriculum; cannot be substituted for a criminal law course taken by law students. General doctrines of criminal liability in the United States; classification of crimes as against persons, property, and the public welfare. Emphasis on the concept of governmental sanctions of the conduct of the individual. Prerequisites: CrJ 101, 102, and consent of the instructor.

352.   CRIMINAL LAW II: CRIMINAL PROCEDURE. 4 HOURS. Required in the criminal justice curriculum; cannot be substituted for a criminal law course taken by law students. The criminal process. Legal problems associated with the investigation of crime, the acquisition of evidence, the commencement of a criminal proceeding, the prosecution and defense of charges, sentencing, and appeal. Principal concern is with the development of existing procedures and examination of current efforts for reform. Prerequisites: CrJ 351 and consent of the instructor.

353.   CRIMINAL LAW III: THE INSTRUMENTALITIES OF CRIMINAL JUSTICE. 4 HOURS. Continues Criminal Justice 352. The agencies that play significant roles in the criminal process. Functions of the law enforcement agency, counsel, and the courts. Particular emphasis on the responsibilities and interrelationships of the agencies examined. Prerequisite: CrJ 352.

354.   EVIDENCE. 4 HOURS. Rules of evidence as they apply to judicial proceedings and administrative hearings relative to the criminal process. Development of the underlying rationale of the rules. Emphasis on the relationship between methods of evidence collection and admissibility. Prerequisite: CrJ 352.

360.   INDUSTRIAL AND COMMERCIAL SECURITY ADMINISTRATION. 4 HOURS. Theories and philosophy of the administration of industrial and commercial security functions; survey of contemporary organization and management of security operations; application of law enforcement principles within private enterprise. Prerequisites: CrJ 103, 258, 259.

391.   PROSEMINAR ON CRIMINAL JUSTICE. 4 HOURS. Study in depth of current issues, problems, and developments of serious concern within the field of the administration of criminal justice. Prerequisites: Junior standing and CrJ 101, 102.

398.   THE PROBLEM OF JUSTICE. 4 HOURS. Same as Political Science 398 and Religious Studies 398. The premodern view of justice, such as Plato's or Aristotle's; the modern understanding of justice, such as Hobbes' or Locke's, which is the foundation of the modern political regime; Rousseau's seminal thought on justice, which is the basis for a variety of reforms and alternatives offered to Hobbes' and/or Locke's political regime. Prerequisite: Two courses in political science, including PolS 150 or 151.

399.   INDEPENDENT STUDY. 2 TO 8 HOURS. For criminal justice majors only. Independent study and research, under the direct supervision of a faculty member, on a subject or subjects not covered in the regular curriculum. Prerequisites: Consent of the instructor, obtained by preregistration in the department office; at least five criminal justice courses, including CrJ 101, 102, 205, 206.

Courses for Graduate Students

400.   SYSTEMS CONCEPTS: INTERACTION AND CHANGE. 4 HOURS. Analysis of the criminal justice system as a system. Interorganization structure, the interaction of component parts, organizational analysis, problem formulation, analytic systems methodology, and planned organizational and systems changes and their consequences.

408.   STRATEGIES OF CHANGE AND INNOVATION. 4 HOURS. Analysis of change and innovation in the criminal justice system from both historical and contemporary perspectives. Characteristics of successes and failures in innovation. Programs and goals. Problems and techniques in the evaluation of change.

409.   PLANNED CHANGE IN CRIMINAL JUSTICE ORGANIZATIONS. 4 HOURS. General review of the notion and theories of planned change

on the individual, organizational, and community levels. In-depth analysis of the methods and strategies of change, especially as they apply to the organizations of the criminal justice system. Prerequisite: CrJ 410.

410.   CRIMINAL JUSTICE: PROCESS AND INSTITUTIONS. 4 HOURS. Critical examination of the criminal justice system. The dynamics and processes of contemporary police, judicial, and correctional institutions are evaluated in the context of key historical developments and relevant research.

418.   TEACHING CRIMINAL JUSTICE. 4 HOURS. Development of the ability to recognize the relationships between the three elements of effective teaching: learning objectives; teaching strategy; evaluation procedures found in the field of criminal justice.

420.   POLICE IN A DEMOCRATIC SOCIETY. 4 HOURS. The inherent conflict between individual liberty and the agency set up for the maintenance of social order. The capacity to use force as the core of the police role; the inadequacy of the "war on crime" and other military models. The pros and cons of present limitations on police in detention, questioning, and search. Critiques of the police. The need for the police to speak out. Prerequisite: CrJ 410.

440.   CORRECTIONS AND THE CRIMINAL JUSTICE SYSTEM. 4 HOURS. Theoretical and historical consideration of prison confinement and the various societal alternatives studied in the framework of the overall criminal justice system. Historical review of the gaps between conceptual designs and practices. Prerequisite: CrJ 410.

449.   LEGAL LIMITS AND THE CORRECTIONAL PROCESS. 4 HOURS. The legal structure of the post-adjudicatory criminal justice system. Examination of the major sentencing alternatives and their implications in terms of effectiveness and human rights. Prerequisites: CrJ 470 and concurrent registration in CrJ 440.

460.   FORENSIC SCIENCE LABORATORY I. 4 HOURS. Theory and analysis of criminalistics problems in opinion evidence through examination of materials related to individualization. Methods may include physical and chemical procedures for evaluation, comparison, and particularization. Prerequisite: CrJ 313.

461.   FORENSIC SCIENCE LABORATORY II. 4 HOURS. Advanced instrumental analysis as applied to criminalistics. Simulated crime science evidence is evaluated and alternate instrumental methods are compared. Prerequisite: CrJ 460.

464.   SPECIAL TOPICS IN FORENSIC SCIENCE. 2 TO 4 HOURS. Philosophic, moral, and managerial problems associated with forensic science. Quality control of analytical results; human organ transplants

and time of death; product liability and physical evidence; changing views of psychiatry, mental health, crime, and control. Prerequisites: CrJ 460, 470.

466.   SEMINAR ON RECENT ADVANCES IN FORENSIC SCIENCES. 2 TO 4 HOURS. Discussion of emerging theories and methods and their application. Subjects may include the role of automated analysis, advances in serology, problems of proof and probability theory, detection methods, systems procedures applied to forensic sciences problems. Prerequisite: CrJ 315.

470.   LAW AND ITS BYWAYS. 4 HOURS. Laws and law systems that produce definitions of politically cognizable deviance and procedures for the application of definitions in particular cases. Emphasis on the social dynamics that produce laws and law ways. The impact that implementing institutions can have on the interpretation of laws and on future formulations.

478.   DISCRETIONARY JUSTICE. 4 HOURS. The relationship between rules of law and discretionary justice in all components of the criminal justice system. The consequences flowing either from an extravagant insistence on the letter of the law or from an excessive reliance on discretionary power. Methods for confining, structuring, and checking the uses of discretionary power. Prerequisite: CrJ 470.

480.   CRIME AND SOCIAL CONTROL. 4 HOURS. Analysis of the social context of crime and delinquency causation and definition. The difference between criminal and noncriminal deviance, the function of legal and quasi-legal norms in various social settings, and theories of crime causation.

489.   CRITICAL CRIMINOLOGY. 4 HOURS. Comparison of one of the better, comprehensive descriptions of the criminal justice system with a series of recent critical works that offer alternative conceptions of the system. The assumptions, arguments, supporting data, and differing conclusions of these alternative presentations and evaluation of their adequacy and congruence with experience. Prerequisite: CrJ 480.

490.   RESEARCH METHODOLOGY. 4 HOURS. A foundation for subsequent training in more specialized research methods used by social and behavioral scientists. General consideration of research problems and methods; emphasis on systematic research procedures.

496.   INTERNSHIP IN TEACHING CRIMINAL JUSTICE. 4 HOURS. Teaching criminal justice courses under the supervision of a faculty member. Prerequisite: CrJ 418.

497.   MASTER'S PAPER RESEARCH. 6 TO 10 HOURS. May be repeated for up to a total of 10 hours; a minimum of 6 hours is required.

Students doing research or writing a master's paper register for credit under this number. Prerequisite: Consent of the instructor.

498. INDEPENDENT STUDY OR RESEARCH. 2 TO 12 HOURS. Supervised projects, which may consist of extensive readings in criminal justice, research on special problems not included in the regular course offerings, an internship in an agency of criminal justice or a practicum in a department of criminal justice at a junior or four-year college. Research undertaken for this course may not duplicate that being done for Criminal Justice 499. Prerequisites: Consent of the instructor and approval of the department.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for up to a total of 16 hours; a minimum of 12 hours is required. Students doing thesis research or writing a thesis register for credit under this number. Prerequisites: Consent of the student's adviser; acceptance of the thesis topic and preliminary thesis outline by the thesis committee.

DOCTOR OF ARTS

The Doctor of Arts is offered in chemistry and mathematics. The department of the candidate's discipline supervises and directs the programs of Doctor of Arts candidates.

James L. Norr, Acting Coordinator

Associated Faculty

The associated faculty teach core Doctor of Arts courses and assist in carrying out Doctor of Arts projects. For faculty in the chemistry and mathematics departments, see the department listings in this bulletin. Other associated faculty members are:

Professors: Maurice Eash (Education), Joseph I. Lipson (Geology), Susan Markle (Psychology), David Miller (Office of Instructional Resources Development), Harriet Talmage (Education), Herbert Walberg (Education)

Associate Professors: Kathleen S. Crittenden (Sociology), L. Rowell Huesmann (Psychology and Computer Center), Sharad R. Laxpati (Information Engineering), Glenn K. Manacher (Computer Center and Information Engineering), Philip Tiemann (Education)

Assistant Professors: Thomas A. DeFanti (Computer Center), John Dexter Fletcher (Psychology and Computer Center), James L. Norr (Sociology), Daniel Sandin (Art)

The Doctors of Arts Program provides specialized training in both a discipline and a broad spectrum of related activities ranging from instruction in colleges and universities to the design and administration of educational systems.

The candidate's plan of study is directed and supervised by his discipline department, and he is expected to demonstrate competence in the field of specialization equivalent to that required of PhD candidates. The curriculum couples broad preparation in the discipline—including advanced study in related fields—with specialized training and research in techniques and methods for the transmission of discipline knowledge to college students. The program includes special courses, seminars, laboratory training, and field work covering such topics as educational technology, instructional design, the evaluation of curricula and teaching, and the psychology and sociology of higher education.

The doctoral dissertation must make an original and significant contribution, normally by linking the candidate's specialized knowledge and training in his discipline with some aspect of the instructional process. For example, he might prepare a series of single-concept films designed to teach an emerging new field of chemistry, he might design a computer-assisted course, or he might develop and test a new curriculum sequence in mathematics.

Admission Requirements

Applicants are considered on an individual basis. They must meet the requirements for admission to and be recommended by the department. Consult the department listings in this bulletin for details. In addition, applicants must submit test scores on the Graduate Record Examination (verbal and quantitative and advanced) and three letters of recommendation, at least one of which must comment on the applicant's demonstrated or potential ability as a college teacher and designer of educational materials.

Degree Requirements

Below are the minimum requirements of the Doctor of Arts Program.

Course Requirements:
1. At least 144 quarter hours beyond the baccalaureate.
2. At least 60 quarter hours of course work at the 300 and 400 levels, including at least 48 quarter hours in the major field.
3. At least one special course in instructional methodologies in the major field.
4. At least 20 quarter hours in courses approved as fulfilling the requirements for educational training in the Doctor of Arts Program. At the discretion of the department, this requirement may be met through courses provided by the department itself, through core Doctor of Arts courses, or through a combination of the two.

Supervised Teaching. Each candidate is required to engage in supervised teaching in his discipline field at Chicago Circle or at a cooperating college or university. Not more than 8 quarter hours of credit for supervised teaching may be counted toward the degree.

The candidate's teaching ability is evaluated by a committee of five members appointed by the Dean of the Graduate College on the

recommendation of the department and the Doctor of Arts Committee. At least one member of the evaluation committee shall be an instructional specialist. Ordinarily, the evaluation is made at the end of the student's second year. The committee evaluates the candidate's achievements, attitudes, and instructional materials. In making its evaluation, it may draw on a wide range of evidence, including videotapes of the candidate's classroom performance and his ability to evaluate, criticize, defend, and improve his own work. There may be no more than one vote of fail. On the recommendation of the department head and chairman of the committee, the Dean may allow a second evaluation.

Preliminary Examination. The preliminary examination, which may be written, oral, or both, tests the candidate's grasp of the major and minor fields of his discipline. The timing of the examination is at the discretion of the department but will normally be given no earlier than at the end of the second year of advanced study. For further details, see the section on academic and general regulations and the department listings in this bulletin.

Doctoral Thesis. The candidate must complete and defend a doctoral dissertation. Each department specifies which of the two options the candidate may select.

> *Option A:* The thesis composed of two parts. Part I (at least 16 hours of 499—Thesis Research) devoted to a research problem within the subject matter of the major discipline; and Part II (at least 16 hours of 499) representing an original contribution related to the teaching of a topic within the candidate's major field. Part I of the thesis shall be directed by a member of the graduate faculty of the major department. The candidate defends Part I of the thesis before a committee of at least four persons, of whom two must be permanent members of the Graduate Faculty, and he defends Part II of the thesis before a committee composed of at least four persons, of whom two must be permanent members of the Graduate Faculty and at least one must have a special competence in the educational component of the thesis.

> *Option B:* The thesis composed of a single part (at least 32 hours of 499—Thesis Research). It must make an original contribution related to the teaching of a topic within the candidate's major field. It is administered as described under Option A, Part II.

Requirements for Holders of Master's Degrees

Students entering the program with a master's degree or other advanced training may petition the Dean of the Graduate College to receive credit for prior work. Such petitions must have the approval of the department, and, as appropriate, the Doctor of Arts Committee.

Requirements for Holders of Doctoral Degrees

The Doctor of Arts programs are also open to holders of doctoral degrees who wish to prepare for a career in college teaching and the creation of instructional materials.

The minimum requirements for obtaining the DA after completion of the requirements for the PhD are the completion of items 3 and 4 of the course requirements above, supervised teaching, and the thesis.

Courses for Graduate Students

402. PSYCHOSOCIOLOGICAL FACTORS IN POST-SECONDARY INSTRUCTION. 4 HOURS. Psychological and sociological factors that influence the organization, the curriculum, and the instructional design of post-secondary educational institutions. Topics include psychological and sociological concepts affecting curriculum and instruction and the role of the disciplines in directing curriculum and instructional decisions.

404. INSTRUCTIONAL DESIGN. 4 HOURS. Development of principles and practice of course development for graduate students who intend to teach and/or create course materials. Topics include match between subject and student characteristics, use of different instructional approaches, use of different media, and the integration of educational technology, role of tests, and integration of elements.

406. INSTRUCTIONAL TECHNOLOGY. 4 HOURS. Training and laboratory work in computer-assisted instruction and audio-visual instructional materials. Consideration of costs involved and problems of integrating instructional technology into the system in appropriate ways. Specific assignments relevant to the student's major disciplinary area.

408. RESEARCH METHODS IN NATURAL EDUCATIONAL SETTINGS. 4 HOURS. Recording, documenting, analyzing, and reporting evidence of natural events related to education. Statistical design and inferential concepts and techniques. Methods for evaluation of instructional systems, materials, techniques, students, and teachers. Relation of research to planning and implementing change.

ECONOMICS

Professors: George Rosen, Head of the Department; Antonio Camacho, William Grampp, Richard Kosobud

Associate Professors: Eliezer B. Ayal, Mildred Levy, Allen Sinai, Houston Stokes

Assistant Professors: Robert D. Auerbach, Donald E. Baer, Gilbert W. Bassett, H. Woods Bowman, Anna M. Craig, Frances V. Flanagan, John F. McDonald

The department offers work leading to the Master of Arts in Urban and Quantitative Economics.

Students may fulfill part of the degree requirements by taking courses in operations research, statistics, and systems analysis offered by the Department of Quantitative Methods. For additional information, see the department listing.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study and must submit test scores from the Graduate Record Examination (quantitative and verbal test and the advanced test in economics.) Although a minumum score is not required, the admissions committee looks favorably on scores at or above the 70th percentile.

In exceptional cases, students with averages of less than 4.00 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Such students are admitted on limited status and will be required to remedy department deficiencies before being admitted to regular status.

An undergraduate degree in economics is desirable but not required. Students with excellent academic records in other disciplines are encouraged to apply. However, the following courses are required of all applicants, regardless of their undergraduate major:

Courses in mathematics equivalent to Mathematics 104, 110, 111, 112 at this University (such as mathematics through introductory calculus).

Courses in statistics equivalent to Quantitative Methods 270, 271, 272 (statistics through regression analysis) at this University.

Once course in intermediate microeconomic theory and one course in macroeconomic theory.

Any deficiency in the above courses must be made up within the first three quarters.

Degree Requirements

Upon admission and in collaboration with his graduate adviser, each student will develop a plan of study. He must meet both the general requirements of the Graduate College and the requirements specified below. Special requirements apply to students who choose to take some of their work in quantitative methods. They should consult the department listing for details. The requirements for all other students for the MA in Economics follow.

Hours. 48 quarter hours of satisfactory course work, with a minimum of 40 hours in economics, of which at least 20 must be at the 400 level.

The following core of required courses provides the student with a body of knowledge and a grasp of economic methodology that is a base for specialization:

Economics 401—Microeconomics I, 4 hours
Economics 411—Macroeconomics I, 4 hours
Economics 402—Microeconomics II or
Economics 412—Macroeconomics II, 4 hours
Economics 345—Advanced Economics Statistics, 4 hours

The Department of Economics faculty strongly recommends that the student take Economics 336—Introduction to Mathematical Economics or the equivalent.

Thesis. Students may elect to write an MA thesis, for which they receive up to 12 hours of credit. Credit hours for the thesis may not be included among the 20 required 400-level hours in economics. The thesis may be original research or a thorough review of a topic based on secondary sources. In either case, competence in the use of economic analysis as well as in the interpretation of results or conclusions is expected of the candidate. The program of students who do not write a thesis must include 4 hours of independent study (Economics 497) or an approved internship program.

Examination. The student must successfully pass a comprehensive written examination based on three core courses in theory. This examination includes one part on Microeconomics I and one part on either Microeconomics II or Macroeconomics II. This comprehensive examination is distinct from the examinations that are given during the courses.

Courses for Graduate and Advanced Undergraduate Students

318.   ECONOMICS OF DECISION-MAKING IN THE FIRM. 4 HOURS. Students may not receive credit for both Economics 318 and 321. Theory and application of the marginalist approach to decision, including treatment of rational decision-making under linear constraints. Prerequisites: Econ 121, Math 112 or the equivalents.

319.   APPLIED PUBLIC ADMINISTRATION ECONOMICS. 4 HOURS. Principles underlying optimal policy-making in government. Analysis of macroeconomic policy; emphasis on the problem of conflicts among policy goals and techniques and use of forecasts. Evaluation of government resource allocation policy, including cost-benefit analysis. Prerequisite: Econ 318.

320.   MACROECONOMIC THEORY. 4 HOURS. Principles of national income accounting, determination of aggregate income and employment, the monetary system in relation to income and employment, short-term income fluctuations, long-term income growth. Prerequisites: Econ 121, Math 112 or the equivalents. Business administration students must have declared a major.

321.   MICROECONOMIC THEORY. 4 HOURS. Operation of individual markets; market structure; theory of the firm; theory of production; demand theory; general equilibrium and welfare economics. Prerequisites: Econ 121, Math 112 or the equivalents. Business administration students must have declared a major.

322.   MANAGERIAL ECONOMICS. 4 HOURS. Application of economic theory to decision-making in the business firm. Demand and cost analysis, including demand forecasts; price policy of the individual

firm; capital budgeting; production analysis; uses of operations research methods. Prerequisite: Econ 318 or 321. Business administration students must have declared a major.

323.   BUSINESS CONDITIONS ANALYSIS. 4 HOURS. Application of economic theory to analysis of changes in aggregate income and employment; quantitative economic models and their uses in the prediction of aggregate and more refined levels of business activity. Prerequisite: Econ 319 or 320. Business administration students must have declared a major.

324.   ECONOMIC HISTORY OF THE UNITED STATES. 4 HOURS. Growth of the American economy from colonial times to the present; special emphasis on contributing forces and factors. Prerequisites: Econ 121 and 8 hours of social sciences. Business administration students must have declared a major.

325.   ECONOMIC HISTORY OF EUROPE. 4 HOURS. Evolution of the economic institutions of Europe, beginning with the origins of capitalism; the development of industry, commerce, transportation, finance, and labor. Prerequisites: Econ 121 and 8 hours of social sciences. Business administration students must have declared a major.

326.   HISTORY OF ECONOMIC THOUGHT I. 4 HOURS. Evolution of positive and normative economics from the sixteenth to the nineteenth centuries. Prerequisites: Econ 121 and 9 hours of social sciences. Business administration students must have declared a major.

327.   COMPARATIVE ECONOMIC SYSTEMS. 4 HOURS. Description and analysis of the normative and positive characteristics of capitalism, fascism, democratic socialism, and communism. Prerequisites: Econ 121 and 8 hours of social sciences. Business administration students must have declared a major.

328.   PUBLIC FINANCE: FEDERAL. 4 HOURS. Theories of public-private resource allocation, principles of taxation, taxes administered at the federal level, federal expenditure programs, debt management. Prerequisite: Econ 319 or 321. Business administration students must have declared a major.

329.   INDUSTRIAL ORGANIZATION. 4 HOURS. The structure of markets; behavior of firms within the market environment; measures of industrial concentration; economics of scale; mergers and the merger movement; price discrimination and tie-in sales; monopoly and cartel arrangements; resale price maintenance; innovation and technological change. Prerequisite: Econ 318 or 321. Business administration students must have declared a major.

330.   GOVERNMENT AND BUSINESS. 4 HOURS. The rationale and the mechanisms of the social control of business; the effects of government action in influencing the behavior of business firms; the

procompetitive policy embodied in the Sherman Act and related legislation. Prerequisite: Econ 318 or 321. Business administration students must have declared a major.

331.   LABOR ECONOMICS. 4 HOURS. Economic problems and issues of trade union organization and wage theory; job security, hours, working conditions, labor legislation, unemployment. Prerequisite: Econ 318 or 320 or 321. Business administration students must have declared a major.

332.   URBAN ECONOMICS. 4 HOURS. Same as Geography 333. Survey of economic problems of cities; the nature and function of cities; the demand for and supply of housing and urban land; the implications of location theory for the spatial pattern of cities; the impact of government programs. Prerequisite: Econ 318 or 321 or Geog 330. Business administration students must have declared a major.

333.   INTERNATIONAL ECONOMICS. 4 HOURS. The balance of payments; fixed, flexible, and multiple exchange rates; the forward exchange market; the international trade multiplier; the transfer problem; capital flows; the law of comparative advantage; the gains from trade; tariffs and subsidies; the factor price equalization theorem; international economic communities. Prerequisite: Econ 318 or 320 or 321. Business administration students must have declared a major.

334.   ECONOMIC DEVELOPMENT. 4 HOURS. Same as Geography 332. Basic problems and characteristics of underdeveloped countries; classical, neoclassical, and modern contributions to the theory of development; major proposals for accelerating development; basic approaches to economic development; laissez-faire, interventionism; role and methods of planning; foreign aid; economic integration. Prerequisite: Econ 319 or 320 or 321; or Geog 330, Econ 121. Business administration students must have declared a major.

335.   ECONOMETRICS. 4 HOURS. Specification of economic models; measurement of variables; estimation of economic relationships and testing of economic hypotheses; single equation problems in estimation; introduction to simultaneous equation estimation. Prerequisites: Econ 320 and either 319 or 321. Business administration students must have declared a major.

336.   INTRODUCTION TO MATHEMATICAL ECONOMICS. 4 HOURS. Application of mathematics to theories of consumer and producer behavior, to the determination of prices in markets, and to growth and stability features of macroeconomic models. Prerequisites: Econ 320 and either 319 or 321, Math 110, 112. Business administration students must have declared a major.

342.   REGIONAL ECONOMICS. 4 HOURS. Same as Geography 334. Theory of location of economic activity, land use patterns, systems of cities, the spatial pattern of city regions, regional growth dynamics,

interregional transactions analysis, spatial mobility of factors, regional income differences, regional welfare and policy. Prerequisites: Econ 320 and either 319 or 321; or Geog 190, 230. Business administration students must have declared a major.

345.   ADVANCED ECONOMIC STATISTICS. 4 HOURS. Probability, hypothesis testing, and estimation, with emphasis on economic applications; econometric models, multiple linear regression, and introduction to problems of estimation. Prerequisites: Math 370 and 372 or QM 272. Business administration students must have declared a major.

351.   HUMAN CAPITAL: THEORY AND APPLICATIONS. 4 HOURS. Concepts of capital applied to human assets; private and social returns to investments in man; application of human capital theory to education, health, income inequality, and other topics. Prerequisite: Econ 319 or 321. Business administration students must have declared a major.

383.   TRANSPORTATION AND PUBLIC POLICY. 4 HOURS. Same as Management 383. The relationship between government and transportation in the United States. Topics include the evolution of transport policy, problems in transport regulation, and current issues in public policy. Prerequisite: Mgmt 380. Business administration students must have declared a major.

390.   SPECIAL TOPICS IN ECONOMICS. 4 HOURS. Exploration of an area not covered in existing course offerings; or study in greater depth, or at a more advanced level, of a problem or subject that is covered in an existing course. Subject matter, and sometimes the prerequisites, varies from quarter to quarter; prior to registration students should consult the department secretary for further information. Prerequisites: Senior standing and 15 hours of 300-level economics courses. Business administration students must have declared a major.

399.   INDEPENDENT STUDY IN ECONOMICS. 2 TO 5 HOURS. May be repeated once for credit. For students who wish to do independent study in an area not covered by existing course offerings or to explore in greater depth a problem or subject covered in a previously taken course. Prerequisites: 15 hours of 300-level economics courses and consent of both a faculty member and the head of the department. Business administration students must have declared a major.

Courses for Graduate Students

400.   MANAGERIAL ECONOMICS. 4 HOURS. Economic analysis applied to business operations; theory of production and cost analysis; capital theory; pricing of products and factors. Prerequisites: Econ 320, 321, Fin 341.

401.   MICROECONOMICS I. 4 HOURS. Theories of consumer and producer behavior and determination of market price. Systematic treatment of the core of microeconomic theory. Prerequisite: Econ 321.

402.   MICROECONOMICS II. 4 HOURS. Axiomatic approach to the theory of exchange; general equilibrium analysis; welfare economics; capital theory. Prerequisite: Econ 401.

411.   MACROECONOMICS I. 4 HOURS. Static and dynamic theories of income and employment; advanced treatment of consumption and investment functions; aggregate production functions; trade cycle and growth; stabilization; theory and policy. Prerequisite: Econ 320.

412.   MACROECONOMICS II. 4 HOURS. Survey of recent research on the determination of employment, the price level, growth rates, and balance of payments variables; current theoretical approaches to these problems; policy proposals. Prerequisite: Econ 411.

425.   BUSINESS CONDITIONS ANALYSIS. 4 HOURS. Applications of micro- and macroeconomic theory to economic fluctuations and the problems caused by them. Topics in forecasting and stabilization policy. Prerequisite: Econ 400.

426.   HISTORY OF ECONOMIC THOUGHT II. 4 HOURS. Economic ideas from the period of mercantilism to the Lausanne school, including physiocracy, classical and neoclassical economics, marginal analysis, and Marxism. Prerequisite: Econ 326.

435.   ADVANCED ECONOMETRICS. 4 HOURS. Detailed treatment of simultaneous equation estimation; evaluation of alternative estimators; problems in estimation; survey of selected large-scale econometric models. Prerequisite: Econ 345.

436.   ADVANCED   MATHEMATICAL   ECONOMICS.   4   HOURS. Illustrations of applications of the calculus and linear algebra to elementary theories of consumer and producer behavior and to price formation in markets. Applications in macroeconomics. Prerequisite: Math 131 or the equivalent.

460.   INDUSTRIAL ORGANIZATION. 4 HOURS. Analysis of industry structure, behavior, and performance; firms in imperfect competition; concentration measurement; oligopoly theory; cartels; price discrimination; vertical and horizontal integration. Prerequisite: Econ 318 or 320 and 321 or the equivalent.

471.   ADVANCED URBAN ECONOMICS. 4 HOURS. Analysis in depth of the major topics in the field of urban economics. Students may be required to prepare a research paper. Prerequisite: Econ 332 or the equivalent.

497. INDEPENDENT STUDY IN ECONOMICS. 4 HOURS. Independent study under the direction of a faculty member. Prerequisite: Consent of the instructor.

498. WORKSHOP IN ECONOMICS. 4 HOURS. A workshop seminar; students and faculty present the results of their research on any special topic in economics. Each participant is required to research a topic or problem and present an acceptable paper on his method and results. Participants criticize and evaluate the materials presented. Prerequisite: Econ 401 or 411.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Students present the results of their thesis research. Prerequisite: Approval of thesis prospectus by the thesis committee.

ENERGY ENGINEERING

Professors: James P. Hartnett, Head of the Department; Paul M. Chung, John H. Kiefer, Irving F. Miller, Satish S. Saxena, Harold A. Simon

Associate Professors: Lyndon R. Babcock, Jr., Joseph C.F. Chow, Allen C. Cogley, David S. Hacker, Ali G. Mansoori, Wolodymr J. Minkowycz, Edward S. Pierson, Stephen Szepe

Assistant Professors: Michael H. Barnes, John C. Cutting, Larry M. Joseph

The department offers a program leading to the Master of Science in Energy Engineering and, jointly with the Department of Materials Engineering, a program leading to the Doctor of Philosophy in Engineering. The department also cooperates with the Department of Geological Sciences in offering a coordinated program of study for students interested in the field of geotechnical engineering and geosciences. This program, leading to the Doctor of Philosophy in Engineering, will enable the student with interests in soil engineering, rock mechanics, engineering geology, hydrology, environmental geology, geophysics, and other areas of geosciences to pursue advanced work.

These programs are broadly based to accommodate students in aerospace, chemical, mechanical, and power engineering and in related fields. The primary areas upon which these fields are based are continuum and molecular fluid mechanics, heat and mass transfer, and macroscopic and microscopic thermodynamics.

After the student is admitted to the Graduate College, he is assigned a temporary adviser; he is required to choose a permanent adviser during the first year. As soon as the permanent adviser has been selected, the student must outline the complete program he proposes for the degree (MS or PhD) in consultation with his adviser and the graduate committee of the department.

The PhD program includes the following broad areas of specialization: continuum mechanics, environmental engineering, fluid mechanics, gas dynamics, geotechnical engineering, heat transfer, metallurgy, plasma dynamics, soil engineering, chemical engineering, and structures. Of these, the

Department of Energy Engineering offers study in the fields of chemical engineering, environmental engineering, fluid mechanics, gas dynamics, and heat transfer. Students are permitted and encouraged to follow interdisciplinary programs that may include more than one area of specialization and may require enrollment in courses in more than one department.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study and must submit three letters of recommendation. In exceptional cases, students who have averages of less than 4.00 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Applicants who have majored in fields other than engineering must remedy deficiencies in their preparation before being granted full standing in the graduate program.

Degree Requirements

A grade point average of at least 4.00 is required. Credit toward a graduate degree is not given for any course in which a grade of less than C has been obtained.

Master of Science

For the degree, 48 quarter hours are required, at least 16 of which must be in 400-level courses. A student may or may not submit a thesis; if he does so, 16 hours of Energy Engineering 499—Thesis Research will be credited toward the degree. If he does not present a thesis, he must complete a research project under the guidance of a department adviser. This project requires a report that demonstrates to the adviser's satisfaction the ability of the student to conduct research at the master's level. Upon completion of this project 4 hours of credit is awarded. If the candidate submits a thesis, he is exempt from the project, but at the completion of the thesis he must defend it before an examining committee.

Doctor of Philosophy

All students who plan to study for the PhD are required to pass one out of a maximum of two written preliminary examinations, offered twice each year. This requirement must be satisfied within the first year if the student enters with a master's degree and within one year after the completion of 48 credit hours of graduate study if he enters with a bachelor's degree. For students who are admitted on limited standing with specified deficiencies to be removed, the above time limits will be extended as deemed appropriate in each case by the graduate committee of the department.

For the PhD a minimum of 96 hours of course work beyond the bachelor's degree is required, of which at least 32 hours must consist of 400-level courses. The total must include a major, the scope of which is to be

determined by the adviser and the graduate committee of the department, and a minor of at least 24 quarter hours. Credit in two courses from the Department of Materials Engineering and at least 12 quarter hours in courses offered by the Department of Mathematics, of which at least three hours must be at the 400 level, are required.

A major requirement of the PhD program is the completion of a thesis based on original research carried out under the supervision of the student's adviser. The thesis, also written under the supervision of the adviser, must be defended before an examining committee.

Courses for Graduate and Advanced Undergraduate Students

304. TRANSPORT PHENOMENA. 4 HOURS. Introduction to continuum theory of momentum, energy, and mass transfer. Transport of scalar and vector quantities. Reynolds's transport theorem. General differential equations of transport phenomena. Momentum shell balances. Energy transport. Diffusion. Couple operations: free convection, simultaneous heat and mass transfer. Prerequisites: EnrE 201, 211.

305. STATISTICAL THERMODYNAMICS. 4 HOURS. Microscopic statistical approach to thermodynamic systems. Calculation of partition function and thermodynamic properties. Polyatomic systems; chemical equilibrium; other engineering applications. Prerequisites: EnrE 201; Math 220 or the equivalent.

307. KINETIC THEORY OF GASES AND TRANSPORT PHENOMENA. 4 HOURS. Basic concepts of kinetic theory of gases. Equations of state and their molecular interpretation. Elementary classical statistics, molecular collisions. Application of the kinetic theory to viscosity, heat conduction, and diffusion. Prerequisite: Completion of the core program.

311. OCEAN AND ESTUARY HYDRODYNAMICS. 4 HOURS. Fluid mechanics of oceans, estuaries, coastlines, and lakes. Tidal, current, and wave phenomena of large, free-surface bodies of water in rotating coordinates. Laboratory work with rotating water table and wave generation and measurements. Prerequisite: EnrE 214.

312. POROUS MEDIA. 4 HOURS. Mechanics of fluid flow in porous media. Steady and unsteady laminar flow in isotropic and anisotropic media. Multiphase and multilayered systems. Prerequisites: EnrE 212, 215.

313. FLIGHT DYNAMICS: STABILITY AND CONTROL. 4 HOURS. Static and dynamic stability and control of six-degree-of-freedom machines with aerodynamic and propulsive loading. Development of the complete force, moment, orientation, and control equations. Laboratory in aerodynamic force measurements and analog simulation of stability and control. Prerequisite: EnrE 212.

314. PROPULSION. 4 HOURS. Thermodynamics and fluid mechanics of air breathing engines. Performance of rockets—chemical, nuclear, and electrical. Prerequisite: EnrE 213.

316. INTRODUCTION TO CONTINUUM MECHANICS. 4 HOURS. Same as Materials Engineering 316. Cartesian tensors, kinematics of fluids and solids, convervation equations, constitutive equations for simple materials. Examples. Prerequisites: EnrE 211 or MatE 204, Math 220.

317. INTERMEDIATE FLUID MECHANICS. 4 HOURS. Development of the conservation equations for a Newtonian fluid: continuity, Navier-Stokes, and energy equations. Some exact and approximate solutions of highly viscous, viscous, and inviscid flow problems. Prerequisite: Math 220 or the equivalent.

318. ELEMENTS OF TURBULENT FLOW AND MIXING. 4 HOURS. Turbulent transport equations; statistical nature of turbulent transports; recent developments in turbulent mixing; free shear flows; stratified flows; wall shear flows. Prerequisites: EnrE 214 and any one of EnrE 221, 234, 311, 361.

319. ACOUSTICAL FLUID MECHANICS. 4 HOURS. Physical description of acoustical sources, propagation, and receivers. Fluid turbulence, oscillations, and instabilities as sources of noise. Applied acoustics for the design of sound control devices and materials. Laboratory in the calibration and use of acoustical instrumentation. Fluid sound sources. Prerequisite: EnrE 213.

321. INTERMEDIATE HEAT TRANSFER. 4 HOURS. Topics in conduction, convection, and radiation with emphasis on exact solutions; extended surfaces, two-phase flow, entrance length problems, real surface and gaseous radiation problems, and combined modes of heat transfer. Laboratory to complement the lectures. Prerequisite: EnrE 221.

325. COMBUSTION ENGINEERING. 4 HOURS. Topics in combustion, providing both a theoretical and applied understanding of flame processes as they relate to furnace design, air pollution, and propulsion. Heat and mass transfer by various modes, chemistry and dynamics of combustion phenomena. The course relates to material found in current literature. Prerequisites: EnrE 201 and either 214 or 234.

331. CHEMICAL ENGINEERING THERMODYNAMICS. 4 HOURS. Review of classical engineering thermodynamics. The property relations and mathematics of properties. Thermodynamics of energy conversion and fluid flow. Multicomponent systems and multicomponent phase equilibria. Equilibrium in chemically reacting systems, heterogeneous equilibrium, Gibbs phase rule, and electrochemical processes. Prerequisite: EnrE 201 or the equivalent.

335.   PHYSICAL PROPERTIES OF FLUIDS. 4 HOURS. Prediction and correlation of the various equilibrium and nonequilibrium properties of pure fluids and their mixtures, such as critical constants, vapor pressure, latent heat of vaporization, heat capacity, heat of formation, surface tension, virial coefficients, viscosity, thermal conductivity, and diffusion coefficients. Prerequisites: EnrE 201, 211.

341.   EXPERIMENTAL METHODS AND TECHNIQUES. 4 HOURS. Purpose and design of experiments; statistical analysis of errors; wind tunnel, shock tube, high vacuum and chemical reactor techniques; theory of mechanical, thermal, optical, and chemical measurements. Prerequisite: Graduates, none; undergraduates, consent of the instructor.

345.   INTRODUCTION TO CHEMICAL PROCESS AND ENERGY CONVERSION CONTROL. 3 HOURS. Analysis and formulation of chemical and energy conversion operations requiring control. Design and analysis of feedback and feedforward systems used to control chemical and energy conversion equipment. Stability, tuning, and simulation of control systems using analytical techniques and digital computers. Prerequisites: Math 220, EnrE 287.

351.   ELECTROMECHANICAL ENERGY CONVERSION I. 4 HOURS. Conservation of energy and electromagnetic forces. Principles of rotating machines and equations of motion. Applications to synchronous, induction, dc, and novel machines. Linear and nonlinear lumped-parameter systems, stability. Laboratories. Prerequisites: InfE 212, 219.

352.   ELECTROMECHANICAL ENERGY CONVERSION II. 4 HOURS. Continues Energy Engineering 351. Completion of rotating machines and lumped-parameter systems. Interaction of electromagnetic fields with stationary and moving continuous media, Maxwell stress tensor, waves and instabilities. Applications to energy conversion with emphasis on fluids (magnetohydrodynamics). Laboratories. Prerequisites: EnrE 211, 351, InfE 221.

353.   DIRECT ENERGY CONVERSION. 4 HOURS. Novel methods of converting heat directly to electrical energy. Topics are chosen from among, but not limited to, magnetohydrodynamics, thermoelectrics, thermionics, and fuel cells. Prerequisites: EnrE 211, 351.

361.   ATMOSPHERIC MOTIONS. 4 HOURS. The equations of motion on a rotating earth and their application to meteorology. Various aspects of inertial, geostrophic, and gradient winds. Atmospheric turbulence and flow in the earth's boundary layer. Laboratory modeling criteria and dynamic similitude. Diffusion of heat, water vapor, and atmospheric pollutants. Prerequisite: EnrE 214.

372. WATER RESOURCES AND POLLUTION CONTROL. 4 HOURS. Hydraulics of water supply and distribution systems. Water quality tests for biological and chemical pollutants. Basic principles and theory of water purification and sanitary engineering, including physical, chemical, and biological treatment processes. Advanced water reclamation techniques. Prerequisites: Chem 121, EnrE 261.

375. AEROSOLS ENGINEERING. 4 HOURS. Classification, distribution, convection, diffusion, and dispersion of aerosols in laminar and turbulent flows. Coagulation, photophoresis, thermophoresis, and diffusiophoresis. Application of the theory to pollution control technology. Prerequisite: EnrE 214 or 234.

386. CHEMICAL REACTION ENGINEERING. 4 HOURS. Kinetics of homogeneous single reactions. Ideal reactors: batch, stirred tank, and plug flow systems. Conversion and yield in multiple reactions. Design and optimization of reactors. Nonisothermal reactors. Prerequisite: Chem 342 or the equivalent.

391. SEMINAR. 1 TO 4 HOURS. May be repeated for credit. Topics of mutual interest to a faculty member and a group of students are announced by department bulletin or the quarterly timetable. Prerequisite: Consent of the instructor.

396. SENIOR DESIGN I. 4 HOURS. Same as Bioengineering 396, Information Engineering 396, Materials Engineering 396, and Systems Engineering 396. Introduction to engineering economics, legal and social constraints on design, safety and reliability theory, and the use of simulation and optimization techniques in the engineering design process. Prerequisites: Senior standing and completion of all core requirements in the College of Engineering.

397. SENIOR DESIGN II. 4 HOURS. Same as Bioengineering 397, Information Engineering 397, Materials Engineering 397, and Systems Engineering 397. Application of principles of engineering and engineering design methodology to the solution of a large-scale problem. May be taken in any department, regardless of area of concentration. Prerequisite: EnrE 396.

Courses for Graduate Students

401. ADVANCED THERMODYNAMICS. 4 HOURS. The laws of thermodynamics. General conditions for equilibrium and stability. Thermodynamic potentials. Phase transition and critical phenomena. Systems in electric, magnetic, gravitational, and centrifugal fields. Principles of irreversible thermodynamics. Onsager's fundamental theorem. Engineering applications. Prerequisites: EnrE 202, Math 220 or the equivalents.

402. FLUID-PHASE EQUILIBRIA. 4 HOURS. Application of the laws of thermodynamics to fluid-phase equilibria systems. Concepts of chem-

ical potential, fugacity, and activity. Application of phase rule to multicomponent fluids. Latent heat and vapor pressures. Consistency tests. Engineering applications. Prerequisite: EnrE 331.

403. THERMODYNAMICS OF MULTICOMPONENT SYSTEMS. 4 HOURS. Application of thermodynamics to chemical engineering systems. Laws of corresponding states and conformal solution theories. Dilute, ideal, near-ideal, and nonideal solutions. Molecular considerations and their use for prediction and correlation of data. Prerequisite: EnrE 402 or the equivalent.

404. IRREVERSIBLE THERMODYNAMICS. 4 HOURS. Irreversible systems approaching equilibrium. Method of irreversible thermodynamics; Onsager's fundamental theorem; statistical and kinetic bases of the theorem. Engineering applications: chemical and electrochemical reactions; thermal diffusion and diffusion thermophenomena; thermoelectric and thermomagnetic phenomena. Thermodynamic time. Prerequisite: EnrE 401 or the equivalent.

405. ADVANCED STATISTICAL THERMODYNAMICS. 4 HOURS. Electromagnetic radiation, quantum mechanics of solids, diatomic and polyatomic gases, statistical mechanics of interacting particles, real gases and liquids, chemical equilibrium and irreversible processes; emphasis on the engineering applications. Prerequisite: EnrE 305.

406. ADVANCED TRANSPORT PHENOMENA. 4 HOURS. Development of the concepts of momentum, heat, and mass transfer by molecular motion, in laminar flow, and in arbitrary continuums. Interphase transport and transport in turbulent flow. Transport by radiation and transport in large flow systems. Prerequisite: EnrE 304 or the equivalent.

407. KINETIC THEORY OF NONUNIFORM GASES. 4 HOURS. Distribution function: Boltzmann equation and its solution, two-particle collisions, inverse collisions, collision cross-sections, intermolecular forces, derivation of transport coefficients of gases, and thermal diffusion. Prerequisites: EnrE 307, Math 322.

412. POTENTIAL FLOW. 4 HOURS. Fluid kinematics, fundamental equations, exact and approximate solutions of the potential equation, conformal mapping, airfoil theory, and surface waves. Prerequisite: EnrE 212 or the equivalent.

414. MECHANICS OF VISCOUS FLUIDS. 4 HOURS. Internal and external flows. Boundary layer analysis. Similarity solutions, integral methods, and other techniques for treating laminar and turbulent flows. Prerequisite: EnrE 310 or the equivalent.

416. COMPRESSIBLE FLUID MECHANICS. 4 HOURS. Conservation equations, equations of state, surface of discontinuity, one-dimensional and two-dimensional subsonic and supersonic flows,

Prandtl-Mayer expansions and shock phenomena, theory of characteristics, and hodograph methods. Prerequisite: EnrE 213 or the equivalent.

418.   FUNDAMENTALS OF TURBULENCE. 4 HOURS. Mathematical descriptions of turbulence field; kinematics of homogeneous turbulence; correlation and spectrum tensors; dynamic behavior of isotropic turbulence; universal equilibrium theory; nonisotropic turbulence; transport processes in turbulent flows. Prerequisites: EnrE 414 or 422 and Math 323 or the equivalent.

419.   NONLINEAR CONTINUUM MECHANICS I. 4 HOURS. Same as Materials Engineering 419. Kinematics and fundamental laws of mechanics. General constitutive equations; reduced constitutive equations. Homogeneous motions of simple bodies. Isotropic group, simple fluids, simple solids, simple subfluids. Examples. Prerequisite: EnrE 316.

420.   NONLINEAR CONTINUUM MECHANICS II. 4 HOURS. Same as Materials Engineering 420. Special classes of materials. Simple fluids, viscometric flows, the Weissenberg effect. Isotropic elastic materials, exact solutions. Wave propagation. Thermodynamics. Nonlinear viscoelastic materials, polar materials, and other materials. Prerequisite: EnrE 419.

421.   HEAT CONDUCTION. 4 HOURS. Analysis of heat conduction in solids, including the use of Fourier series, integral transforms, similarity transformations, and approximate methods. Prerequisite: Consent of the instructor.

422.   CONVECTIVE HEAT TRANSFER. 4 HOURS. Conservation equations. Momentum, heat, and mass transfer in laminar and turbulent boundary layers for internal and external flows. Convective heat transfer at high velocities. Heat transfer with change of phase. Special topics in convective heat transfer. Prerequisite: EnrE 310 or the equivalent.

424.   THERMAL RADIATION. 4 HOURS. Introduction to Planck's quantum theory. Black-body radiation; Wien's law; Stephan-Boltzmann's law. Basic concepts of total and spectral emissivity, absorptivity, reflectivity, and transmissivity. Kirchhoff's law. Radiation exchange between solid surfaces; gaseous radiation; radiation-convection interaction. Prerequisite: Consent of the Instructor.

426.   RADIATION GAS DYNAMICS. 4 HOURS. Basic laws and definitions of thermal radiation. Energy transfer in absorbing, emitting, and scattering media. Thin and thick approximate methods. Radiative equilibrium. Combined conduction and radiation. Combined convection and radiation. Prerequisites: EnrE 414 or 422 and Math 321 or the equivalent.

431.   ADVANCED CHEMICAL REACTION ENGINEERING. 4 HOURS.
Nonideal reactors; the effects of residence time distribution and
mixedness. Heterogeneous noncatalytic reactions; gas-liquids, liquid-
liquid, and solid-fluid systems. Heterogeneous catalytic reactions. Time
dependent systems; catalyst deactivation. Prerequisite: EnrE 386.

432.   MOLECULAR THEORY OF GAS DYNAMICS. 4 HOURS. Kinetic
theory distribution functions, Liouville theorem and Boltzmann equa-
tion. Moments of Boltzmann equation. Near-equilibrium pertur-
bations; nonequilibrium analyses; rarefied gas flows; shock structure;
nonequilibrium plasmas. Prerequisites: EnrE 304, 310, and Math 322
or the equivalent.

434.   PLASMA DYNAMICS. 4 HOURS. Electromagnetic fields: motions of
charged particles; statistical description of plasmas; ionization phe-
nomena; Landau damping; electromagnetic waves; instabilities.
Prerequisite: EnrE 432.

435.   ADVANCED PROCESS ANALYSIS. 4 HOURS. Analysis and for-
mulation of naturally occurring and industrial processes. Classification
of the processes and the division of each process into subsystems.
Determination of the relations among the subsystems and the math-
ematical modeling of these relationships. Evaluation of how well the
models will represent the real processes. Engineering applications and
interpretation of the results. Prerequisite: EnrE 304 or 406.

436.   CHEMICALLY REACTING FLOWS. 4 HOURS. Nonequilibrium
states; chemical thermodynamics and kinetics. Multicomponent con-
tinuum equations for flow of nonequilibrium fluids. Inviscid non-
equilibrium flows. Boundary layer flows with surface and gas-phase
reactions. Frozen and equilibrium criteria. Waves in relaxing media.
Prerequisites: EnrE 414 or 422, and 416.

438.   SEPARATION PROCESSES. 4 HOURS. Advanced treatment of pref-
erential migration. General theory. Binary and multicomponent
distillation. Absorption, adsorption, and extraction processes. Gas
chromatography and liquid chromatography. Dialysis and mis-
cellaneous other separations. Prerequisite: EnrE 304.

439.   MASS TRANSFER IN LIQUID SYSTEMS. 4 HOURS. Treatment of
modern diffusion theories as applied to liquid-liquid and liquid-solid
systems. Advanced treatment of molecular and macroscopic dif-
fusional phenomena in multiphase, multicomponent systems, including
theory of liquid state, ideal and nonideal solutions, coupled mech-
anisms in diffusion transfer, and engineering design of liquid contacting
equipment. Prerequisite: EnrE 305.

440.   NON-NEWTONIAN FLUIDS. 4 HOURS. Constitutive equations for
non-Newtonian fluids. Simple fluids. Viscoelasticity. Viscometric
flows. Helical flow. Large elastic deformations, stress relaxation. Ther-

modynamics of viscoelastic fluids. Time-temperature superposition. Transport phenomena in non-Newtonian fluids. Experimental methods and results. Prerequisite: EnrE 316.

451. KINETICS OF GAS REACTIONS. 4 HOURS. Basic concepts of reaction rate and mechanism. Collision theory, absolute rate theory, and theory of unimolecular decomposition. Dissociation, recombination, and chain reactions. Combustion, flames, and detonations. Catalysis. Prerequisites: EnrE 304, 305.

491. SPECIALIZED PROBLEMS. 4 TO 12 HOURS. Specialized problems under the supervision of faculty. Prerequisite: Arrangement with the faculty.

493. CURRENT TOPICS IN ENERGETICS. 4 HOURS. Particular topics vary from quarter to quarter depending on the interests of the students and the specialties of the current instructor. Prerequisite: Consent of the instructor.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Individual research in specialized problems under the supervision of faculty. Prerequisite: Arrangement with the faculty.

ENGLISH

Professors: Jay A. Levine, Head of the Department; Paul Carroll, John Conley, John E. Hardy, Alexander Karanikas, Bernard R. Kogan, Louis A. Marder, Ralph J. Mills, John F. Nims, R.B. Ogle, John B. Shipley, James B. Stronks, Mary Thale, Samuel A. Weiss, Maurita Willett, Martin L. Wine

Associate Professors: Beverly Fields, Gloria G. Fromm, Howard H. Kerr, Robert A. Kispert, Michael Lieb, Daniel A. Lindley, John H. Mackin, Patricia McFate, A. LaVonne Ruoff, Gene Ruoff

Assistant Professors: Preston M. Browning, Nancy R. Cirillo, Gerald C. Sorensen, Frederick C. Stern

Degree Programs

The Department of English offers courses of study leading to the Master of Arts in English, with specializations in literature (English and American) and in creative writing.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university, an undergraduate major in English or the equivalent that includes a balanced program in English and American literature beyond the level of sophomore surveys, a grade point

average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study, and a grade point average in English courses of at least 4.20. In exceptional cases, students who have averages of less than 4.00 but above 3.50 may be admitted if they show substantial evidence of ability to complete the program successfully. Depending on their qualifications, such students may be admitted on limited status and will be required to remedy department deficiencies before being admitted to regular status.

Applicants for admission to the graduate programs in the Department of English must submit the following, unless otherwise exempted:

Three letters of recommendation, preferably from professors who are familiar with the applicant's recent work.

A statement of about 250 words presenting the applicant's reasons for wishing to take graduate work in English and the relationship of his work to his professional and other goals.

Graduate Record Examination (GRE) scores for both the general aptitude and advanced literature tests. Ordinarily, the minimum acceptable scores on these tests for admission are at the 60th percentile.

An applicant for admission to the creative writing program must also submit a sample of his writing (at least five poems, a study, a chapter from a novel, or comparable work).

A foreign applicant should submit GRE scores if it is possible for him to take the examination; otherwise, he may be admitted on limited status and required to take the examination in his first quarter in residence. Instead of the 250-word statement, he is required to submit a four- or five-page summary of his educational experience that emphasizes his work in English and American literature and language. He should conclude this summary with his reasons for wanting to do graduate work in the United States.

Degree Requirements

Master of Arts

Language. The student must present evidence of foreign-language competence before taking the MA examination. He may satisfy this requirement (1) by passing an upper-division (200-300 level) literature course in a classical language or in a major modern European language (others by petition) with a grade of A or B or (2) by passing a reading examination. A creative writing student may also satisfy the requirement by successfully completing English 473—Workshop in Translation.

Examination. All candidates are required to pass a master's examination (given each spring and fall). Literature students may take English 497 for 4 quarter hours to prepare for this examination; creative writing students may do so only at the discretion of the chairman of the Program for Writers. If a student fails the examination, he may be allowed to repeat it once.

Specialization in Literature

Hours. A minimum of 48 quarter hours of course work is required. At least 36 of the 48 hours must be in English; the remaining 12 hours may be in courses in other departments or disciplines approved by the student's adviser.

By graduation, the student must have completed satisfactorily at least one course at the 300 or 400 level in each of the following areas in which he has *not* had a course as an undergraduate (sophomore surveys do not fulfill this requirement):

1. English Literature (one in each of the areas below)
    > Before 1500
    > Shakespeare
    > Renaissance through Milton (1500-1660)
    > Restoration-18th Century (1660-1789)
    > 19th Century (1789-1900)
2. American Literature (one in each of the areas below)
    > Beginnings through Hawthorne
    > Melville through Late 19th Century
3. Modern British *or* American Literature

Thesis. None is required; instead, each student submits a *qualifying paper* (25 to 40 pages) for department approval. The qualifying paper may be an enlarged version of a paper written for a 300- or 400-level course taken as a graduate student, may have originated in independent research, or may have arisen independently of any course. The student may enroll in English 497 for 4 hours of credit to write an acceptable qualifying paper.

Specialization in Creative Writing

Hours. A minimum of 48 hours of course work is required: (1) at least 16 hours of 300- or 400-level literature courses (exclusive of 300-level writing courses) in the areas listed under *Specialization in Literature* in which the student has *not* had a course as an undergraduate (sophomore surveys do not fulfill this requirement); (2) no more than 16 hours of creative writing workshops; (3) 12 hours of tutorials (English 497) or of graduate-level literature courses (exclusive of 300-level writing courses) in English or in courses in other departments or disciplines approved by the adviser.

Thesis. Each student must present a thesis consisting of a publishable volume of his work, such as a volume of poems, a novel, or a collection of stories. A miscellaneous volume, containing, for example, poems, critical essays, and short stories, is also acceptable. As these writings are expected to grow out of the writing workshops, credit for English 499—Thesis Research will not be given.

Courses for Graduate and Advanced Undergraduate Students

300. HISTORY OF THE ENGLISH LANGUAGE. 4 HOURS. English in its development. Prerequisite: Senior standing or 12 hours of English.

301. STRUCTURE OF MODERN ENGLISH. 4 HOURS. Critical evaluation of traditional, structural, and transformational grammatical descriptions; detailed survey of a transformational syntax of English. Prerequisite: Engl 300 or Ling 305.

302. INTRODUCTION TO OLD ENGLISH. 4 HOURS. The elements of Old English grammar and the reading of graded prose selections. Prerequisite: Senior standing or 12 hours of English.

303. OLD ENGLISH POETRY AND PROSE. 4 HOURS. Representative selections of prose and poetry of England to 1200, exclusive of *Beowulf.* Prerequisite: Engl 302 or the equivalent.

304. *BEOWULF.* 4 HOURS. A detailed explication of the poem. Prerequisite: Engl 303 or the equivalent.

305. INTRODUCTION TO MIDDLE ENGLISH. 4 HOURS. A linguistic examination of Middle English and its dialects. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

306. MIDDLE ENGLISH LITERATURE, EXCLUSIVE OF CHAUCER. 4 HOURS. Representative selections; emphasis on the more important lyric, dramatic, and narrative works, such as *Piers Plowman, Pearl, Gawain,* and *Everyman.* Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

307. STUDIES IN MEDIEVAL ENGLISH LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a topic, movement, or genre. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

308. CHAUCER. 4 HOURS. A survey of Chaucer's major works. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

310. ENGLISH LITERATURE OF THE RENAISSANCE I. 4 HOURS. Representative selections; emphasis on Skelton, More, Elyot, Wyatt, Surrey, Lyly, Sidney, Spenser, and Marlowe. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

311. ENGLISH LITERATURE OF THE RENAISSANCE II. 4 HOURS. Representative selections; emphasis on Ralegh, Bacon, Donne, Jonson, Hobbes, Herbert, Browne, and Milton. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

312. RENAISSANCE DRAMA, EXCLUSIVE OF SHAKESPEARE. 4 HOURS. May be repeated for a maximum of 8 hours of credit. Content varies between Tudor drama (Udall, Norton, Sackville, Lyly, Kyd, Marlowe, Dekker, and others) and Stuart drama (Chapman, Marston, Jonson, Beaumont, Fletcher, Webster, Middleton, Rowley, and others). Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

313. SHAKESPEARE I. 4 HOURS. The poems and early plays. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

314. SHAKESPEARE II. 4 HOURS. The later plays. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

315. MILTON. 4 HOURS. Same as Religious Studies 350. A survey of Milton's poetry and prose, with emphasis on his major works. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

316. MAJOR AUTHORS OF RENAISSANCE LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a single figure, such as Spenser, Donne, Jonson. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

317. STUDIES IN RENAISSANCE LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of topic, movement, or genre. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

320. ENGLISH LITERATURE OF THE RESTORATION AND EIGHTEENTH CENTURY I: 1660 TO 1714. 4 HOURS. Representative selections; emphasis on Dryden, Restoration drama, and the early works of Swift and Pope. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

321. ENGLISH LITERATURE OF THE RESTORATION AND EIGHTEENTH CENTURY II: 1715 TO 1744. 4 HOURS. Representative selections; emphasis on the early novelists (Defoe, Richardson, and Fielding) and the later works of Swift and Pope. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

322. ENGLISH LITERATURE OF THE RESTORATION AND EIGHTEENTH CENTURY III: 1745 TO 1789. 4 HOURS. Representative selections; emphasis on the Johnson circle and the mid-century novelists (Richardson, Fielding, Sterne, and Smollett). Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

323. RESTORATION AND EIGHTEENTH-CENTURY DRAMA. 4 HOURS. May be repeated for a maximum of 8 hours of credit. Restoration dramatists (principally Dryden, Etherege, Wycherley, Otway, Shadwell, Vanbrugh, Cibber, and Congreve) and eighteenth-century dramatists (Addison, Steele, Gay, Fielding, Farquhar, Cumberland, Sheridan, Goldsmith, and others). Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

324. THE EIGHTEENTH-CENTURY NOVEL. 4 HOURS. Representative selections; Defoe, Richardson, Fielding, Sterne, Smollett, and some of the minor novelists of the period. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

325. MAJOR AUTHORS OF RESTORATION AND EIGHTEENTH-CENTURY LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a single figure, such as Dryden, Swift, Pope, Johnson, Fielding. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

326. STUDIES IN RESTORATION AND EIGHTEENTH-CENTURY LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a topic, movement, or genre. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

330. ENGLISH LITERATURE OF THE ROMANTIC PERIOD I. 4 HOURS. Representative selections; emphasis on Blake, Wordsworth, and Coleridge. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

331. ENGLISH LITERATURE OF THE ROMANTIC PERIOD II. 4 HOURS. Representative selections; emphasis on Byron, Shelley, and Keats. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

332.   MAJOR AUTHORS OF THE ROMANTIC PERIOD. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a single figure, such as Blake, Wordsworth, Coleridge, Byron, Shelley, Keats. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

333.   STUDIES IN ROMANTIC LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a topic, movement, or genre. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

340.   ENGLISH LITERATURE OF THE VICTORIAN PERIOD I: Poetry. 4 hours. Representative selections; emphasis on Tennyson, Browning, Arnold, Swinburne, Hopkins, Hardy. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

341.   ENGLISH LITERATURE OF THE VICTORIAN PERIOD II: NONFICTION PROSE. 4 HOURS. Representative selections; emphasis on Carlyle, Mill, Newman, Arnold, Ruskin, Pater. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

342.   ENGLISH LITERATURE OF THE VICTORIAN PERIOD III: THE NOVEL. 4 HOURS. Representative selections; emphasis on Dickens, Thackeray, Trollope, Eliot, Meredith, Butler, Hardy. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

343.   MAJOR AUTHORS OF VICTORIAN LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a single figure, such as Arnold, Browning, Carlyle, Dickens, Eliot, Mill, Newman, Tennyson, Thackeray, Trollope. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

344.   STUDIES IN VICTORIAN LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a topic, movement, or genre. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

350.   MODERN BRITISH LITERATURE I: 1890 TO 1930. 4 HOURS. Representative selections; Yeats, Shaw, de la Mare, Conrad, Joyce, Woolf, Lawrence, and others. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

351.   MODERN BRITISH LITERATURE II: 1930 TO THE PRESENT. 4 HOURS. Representative selections; Yeats, Auden, Thomas, Spender, Greene, Huxley, Pinter, and others. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

352.   MODERN BRITISH FICTION: 1900 TO 1945. 4 HOURS. Conrad, Joyce, Lawrence, Orwell, Waugh, Woolf, and others. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

353.   CONTEMPORARY BRITISH FICTION: 1945 TO THE PRESENT. 4 HOURS. Amis, Fowles, Greene, Murdoch, Powell, and others. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

354.   MODERN IRISH LITERATURE: 1880 TO THE PRESENT. 4 HOURS. May be repeated for a maximum of 8 hours of credit. Representativee selections;

emphasis on George Moore, Wilde, Yeats, Gregory, Synge, Stephens, Joyce, O'Faolain, O'Connor. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

355.   MAJOR AUTHORS OF MODERN AMERICAN AND BRITISH LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of one or two figures, such as Auden, Conrad, Eliot, Faulkner, Joyce, Hemingway, Shaw, Yeats. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

356.   STUDIES IN MODERN AMERICAN AND BRITISH LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a topic, movement, or genre. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

357.   MODERN BRITISH POETRY: 1900 TO 1945. 4 HOURS. Representative selections; Hardy, Housman, Yeats, Graves, Auden, and others. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

358.   DEVELOPMENTS IN CONTEMPORARY AMERICAN AND BRITISH POETRY. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a topic, movement, or genre. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

359.   DEVELOPMENTS IN CONTEMPORARY FICTION. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a topic, movement, or genre. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

360.   AMERICAN POETRY I: BEGINNINGS TO 1900. 4 HOURS. Representative selections; Taylor, Emerson, Poe, Whitman, Dickinson, and others. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

361.   AMERICAN POETRY II: 1900 TO 1945. 4 HOURS. Representative selections; emphasis on Frost, Pound, Eliot, Cummings, Stevens, Williams. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

362.   AMERICAN FICTION I: 1800 TO 1860. 4 HOURS. Representative selections; Brown, Cooper, Hawthorne, Melville, and others. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

363.   AMERICAN FICTION II: 1860 TO 1900. 4 HOURS. Representative selections; emphasis on Twain, James, Howells, Adams, Jewett, Frederic, Norris. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

364.   AMERICAN FICTION III: 1900 TO 1945. 4 HOURS. Representative selections; emphasis on Dreiser, Lewis, Fitzgerald, Hemingway, Faulkner, Wolfe. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

365.   CONTEMPORARY AMERICAN FICTION: 1945 TO THE PRESENT. 4 HOURS. Representative selections; Warren, Mailer, Ellison, Nabokov, Malamud, Bellow, and others. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

366.   MAJOR AUTHORS OF AMERICAN LITERATURE THROUGH 1914. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a single figure, such as Hawthorne, Melville, Whitman, Dickinson, Howells, James, Twain, and others. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

367.   PERIODS AND MOVEMENTS IN AMERICAN LITERATURE. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a single topic, such as the American Renaissance, Early National Literature, or the Twenties, or of such movements as Puritanism, Transcendentalisn, Realism, Naturalism, or Imagism. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

368.   STUDIES IN AMERICAN LITERATURE THROUGH 1914. May be repeated for a maximum of 12 hours of credit. Study of a topic or genre. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

375.   HISTORY OF LITERARY CRITICISM I. 4 HOURS. A survey, with emphasis on the major critics from Plato to Johnson. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

376.   HISTORY OF LITERARY CRITICISM II. 4 HOURS. Survey of nineteenth-century and modern literary criticism; emphasis on the major critics from Wordsworth to the present. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

377.   STUDIES IN LITERARY CRITICISM. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a topic or movement. Content varies. Prerequisite: Engl 240 or the equivalent.

383.   TEACHING ENGLISH AS A SECOND LANGUAGE. 4 HOURS. Same as Education 383. The methodology of teaching English to residents of the United States who do not speak the language, especially Spanish-Americans. Prerequisite: Engl 300 or 205 or Ling 305.

385.   STUDIES IN TEACHING THE ENGLISH LANGUAGE AND LINGUISTICS. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a topic; content varies.

386.   STUDIES IN TEACHING RHETORIC AND COMPOSITION. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a topic; content varies.

387.   ADOLESCENT CULTURE AND THE TEACHING OF ENGLISH. 4 HOURS. Relationships between English instruction and student attitudes and beliefs. Emphasis on adolescent response to language and literature. Prerequisite: Senior standing or 12 hours of English.

388.   NONPRINT MEDIA AND THE TEACHING OF ENGLISH. 4 HOURS. The effects of film, television, and technology on the teaching of English. Prerequisite: Senior standing or 12 hours of English.

390.   THE WRITING OF POETRY. 4 HOURS. May be repeated for a maximum of 8 hours. Advanced practice; emphasis on analysis of student work and on published examples. Prerequisite: Satisfactory completion of Engl 210 or the equivalent.

391.   THE WRITING OF FICTION. 4 HOURS. May be repeated for a maximum of 8 hours. Advanced practice; emphasis on analysis of student work and on published examples. Prerequisite: Satisfactory completion of Engl 211 or the equivalent.

395.   STUDIES IN BRITISH AND AMERICAN DRAMA. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of an author, topic, or movement. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

398.   STUDIES IN GENRES, MODES, MULTIMEDIA, INFLUENCES, AND MOVEMENTS. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a particular subject in literature. Content varies. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

399.   INDEPENDENT STUDY. 1 TO 4 HOURS. Open only to English majors and graduate students in English. Admission to this course is only on the advice and initiation of the department. Individual studies under the direction of an assigned faculty member. The nature of the work is determined by the tutor on the basis of the student's needs and interests. Prerequisite: Senior standing.

Courses for Graduate Students

400.   INTRODUCTION TO BIBLIOGRAPHY AND RESEARCH. 4 HOURS. Required of graduate students in English. Detailed study of bibliographic tools and examination of various kinds of research papers.

405.   SEMINAR ON OLD ENGLISH. 4 HOURS. A topics in Old English; emphasis on literature or philology. Content varies. Prerequisite: Engl 314 or the equivalent.

406.   INTRODUCTION TO OLD NORSE. 4 HOURS. Same as German 436. The grammar of Old Norse and the reading of selected prose and poetry. Prerequisite: A reading knowledge of some other older Germanic dialect, such as Old English, Old Saxon, or Gothic.

415.   SEMINAR ON MIDDLE ENGLISH LITERATURE. 6 HOURS. Individual conferences on assigned papers are required. Middle English and Middle Scots literature, exclusive of Chaucer. Prerequisite: A minimum of 4 hours in medieval English literature.

416.   SEMINAR ON CHAUCER. 6 HOURS. Individual conferences on assigned papers are required. Content varies. Prerequisite: A minimum of 4 hours in medieval English literature.

420.   SEMINAR ON RENAISSANCE LITERATURE. 6 HOURS. May be repeated for a maximum of 12 hours. Individual conferences on assigned papers are required. One author, topic, movement, or genre. Content varies. Prerequisite: A minimum of 4 hours in Renaissance literature.

421.   SEMINAR ON SHAKESPEARE. 6 HOURS. May be repeated for a maximum of 12 hours. Individual conferences on assigned papers are required. Prerequisite: A minimum of 4 hours in Shakespeare.

422.   SEMINAR ON MILTON. 6 HOURS. Individual conferences on assigned papers are required. Prerequisite: A minimum of 4 hours in Renaissance literature.

425. SEMINAR ON RESTORATION AND EIGHTEENTH-CENTURY LITERA-TURE. 6 HOURS. May be repeated for a maximum of 12 hours. Individual conferences on assigned papers are required. One author, topic, movement, or genre. Content varies. Prerequisite: A minimum of 4 hours in Restoration and eighteenth-century literature.

430. SEMINAR ON ROMANTIC LITERATURE. 6 HOURS. May be repeated for a maximum of 12 hours. Individual conferences on assigned papers are required. One author, topic, or movement. Content varies. Prerequisite: A minimum of 4 hours in Romantic literature.

435. SEMINAR ON VICTORIAN LITERATURE. 6 HOURS. Individual conferences on assigned papers are required. One author, topic, movement, or genre. Prerequisite: A minimum of 4 hours in Victorian literature.

440. SEMINAR ON MODERN BRITISH LITERATURE. 6 HOURS. May be repeated for a maximum of 12 hours. Individual conferences on assigned papers are required. One author, topic, movement, or genre. Content varies. Prerequisite: A minimum of 4 hours in modern British literature.

445. SEMINAR ON AMERICAN LITERATURE. 6 HOURS. May be repeated for a maximum of 12 hours. Individual conferences on assigned papers are required. One author, topic, or movement. Content varies. Prerequisite: A minimum of 4 hours in American literature.

447. SEMINAR ON BLACK LITERATURE. 6 HOURS. May be repeated for a maximum of 12 hours. Individual conferences on assigned papers are required. One author, topic, movement, or genre. Content varies. Prerequisite: A minimum of 4 hours in black literature or American literature.

455. TEACHING COLLEGE ENGLISH. 4 HOURS. Pass/fail grade only. Methods, materials, and practice in teaching college composition.

470. PROGRAM FOR WRITERS: POETRY WORKSHOP. 4 HOURS. May be repeated for a maximum of 12 hours. Emphasis on discussion of poems written by the students. Prerequisite: Admission to the Program for Writers.

471. PROGRAM FOR WRITERS: FICTION WORKSHOP. 4 HOURS. May be repeated for a maximum of 12 hours. Emphasis on discussion of fiction written by the students. Prerequisite: Admission to the Program for Writers.

472. PROGRAM FOR WRITERS: CRITICISM WORKSHOP. 4 HOURS. May be repeated for a maximum of 12 hours. Emphasis on discussion of criticism written by the students. Prerequisite: Admission to the Program for Writers.

473. PROGRAM FOR WRITERS: TRANSLATION WORKSHOP. 4 HOURS. May be repeated for a maximum of 12 hours. Emphasis on discussion of translation by the students. Prerequisite: Admission to the Program for Writers.

474. PROGRAM FOR WRITERS: NONFICTION WORKSHOP. 4 HOURS. May be repeated for a maximum of 12 hours. Emphasis on discussion of nonfiction written by the students. Prerequisite: Admission to the Program for Writers.

475. PROGRAM FOR WRITERS: EXPERIMENTAL WRITING WORKSHOP. 4 HOURS. May be repeated for a maximum of 12 hours. Emphasis on discussion of experimental writing by the students. Prerequisite: Admission to the Program for Writers.

480. SEMINAR ON GENRES OF LITERATURE. 6 HOURS. May be repeated for a maximum of 12 hours. Individual conferences on assigned papers are required. A single genre, such as poetry, fiction, nonfiction, drama, or literary criticism.

481. SEMINAR ON LITERATURE AND RELATED FIELDS. 6 HOURS. May be repeated for a maximum of 12 hours. Individual conferences on assigned papers are required. The relationship between literature and such fields as the fine arts, philosophy, psychology, religion, science, and sociology. Prerequisite: A minimum of 4 hours in the area of the literature to be studied.

482. SEMINAR ON LITERARY CRITICISM. 6 HOURS. May be repeated for a maximum of 12 hours of credit. Individual conferences on assigned papers are required. Study of a topic or movement. Content varies. Prerequisite: A minimum of 4 hours in literary criticism.

497. RESEARCH IN ENGLISH. 2 TO 8 HOURS. May be repeated for a total of 16 hours. Students are assigned to this course at the discretion of the department. Independent research in English and American literature, linguistics, and creative writing.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Students are assigned to this course at the discretion of the department. For students involved in thesis research and the writing required for advanced degrees.

FRENCH

Professors: William M. Schuyler, Head of the Department; Robert E. Hallowell, Marie E. Lein, Charles M. Lombard

Associate Professors: Priscilla P. Clark, Kenneth I. Perry, Franklin P. Sweetser, Marie-Odile Sweetser, Dorothy R. Thelander

Assistant Professors: Edmund J. Bender, Peter V. Conroy, Jr., Barbara G. Mittman, June Moravcevich

The department participates in an intercampus program with the Department of French on the Urbana-Champaign campus of the University of Illinois leading to a Master of Arts in French Language and Literature with a thesis or nonthesis option.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study. In exceptional cases, students who have averages of less than 4.00 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Fluency in written and spoken French and a knowledge of French literature and culture are essential. Applicants must submit three letters of recommendation from former professors, a statement of about 250 words presenting reasons for wishing to take graduate work in French, and Graduate Record Examination scores for both the aptitude test and the advanced test in French.

Degree Requirements

Program A *(nonthesis option)*

1. A minimum of 48 hours of course work, of which at least 36 hours must be taken in the Department of French, including 20 hours in 400-level courses. With the approval of the student's adviser, 12 hours of graduate work may be taken in any field in which the student is interested and for which he has the prerequisites.

2. Required courses: French 403—*Explication de textes;* two graduate seminars in French literature (French 440); one graduate course in French history to be taken concurrently with one of the seminars in literature. Both courses should deal with the same period, in order that they may complement each other.

3. A comprehensive oral and written examination covering the main currents of French literature and culture from the Middle Ages to the present.

Program B *(thesis option)*

1. A minimum of 36 quarter hours of course work, of which 16 hours must be in 400-level courses.

2. A master's thesis (French 499—maximum of 12 hours of credit).

3. Required courses: one graduate seminar in French literature (French 440); French 403—*Explication de textes;* one graduate course in French history dealing with the same period as the seminar or the thesis.

4. A comprehensive oral and written examination covering the main currents of French literature and culture from the Middle Ages to the present.

Courses for Graduate and Advanced Undergraduate Students

301. STYLISTICS I: PROSE. 4 HOURS. Detailed analysis of the style of selected French authors; practice in advanced composition. Prerequisite: Fr 222 or the equivalent.

302. STYLISTICS II: POETRY. 4 HOURS. Detailed analysis of the style of selected French authors; practice in advanced composition. Prerequisite: Fr 222 or the equivalent.

311. SHORT PROSE FICTION. 4 HOURS. French prose narrative forms, excluding the novel, from the Renaissance to the present. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

316. FRENCH POETRY I. 4 HOURS. Major poets from the fourteenth through the eighteenth centuries. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

321. FRENCH LITERATURE OF THE MIDDLE AGES I. 4 HOURS. From the origins to 1300. Texts in modern French: *chansons de geste,* courtly romances (Chrétien de Troyes *et al.*), *Roman de Renard,* and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

322. FRENCH LITERATURE OF THE MIDDLE AGES II. 4 HOURS. The fourteenth and fifteenth centuries. Texts in modern French: chroniclers, lyric poetry, religious and comic drama. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

323. HISTORY OF THE FRENCH LANGUAGE. 4 HOURS. From its origins to the present. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

332. FRENCH LITERATURE OF THE SIXTEENTH CENTURY. 4 HOURS. Major writers read in modern French: Marot, Scève, Rabelais, Ronsard, Du Bellay, Montaigne, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

333. THE *PLÉIADE*. 4 HOURS. Theory and practices of the *Pléiade* poets: Ronsard, Du Bellay, Belleau, Baïf, Jodelle, Pontus de Tyard, Desportes, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

334. MONTAIGNE: HIS *ESSAIS* AND HIS AGE. 4 HOURS. Detailed study of Montaigne's life, thought, and times as reflected in the *Essais*. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

341. SEVENTEENTH-CENTURY FRENCH PROSE WRITERS. 4 HOURS. Reading and analysis of major prose writers: Descartes, Pascal, Bossuet, Mme. de Sévigné, La Bruyere, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

342. SEVENTEENTH-CENTURY FRENCH THEATER. 4 HOURS. Reading and analysis of major dramatists: Corneille, Molière, and Racine. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

344. SEVENTEENTH-CENTURY FRENCH POETRY. 4 HOURS. Reading and analysis of major poets: Malherbe, Baroque poets, La Fontaine, and Boileau. Prerequisite: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

345. THE SEVENTEENTH-CENTURY FRENCH NOVEL. 4 HOURS. Reading and analysis of major novelists: d'Urfé, Sorel, Scarron, Cyrano, Mme. de Lafayette, *Les Lettres Portugaises,* and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

351. FRENCH LITERATURE OF THE EIGHTEENTH CENTURY I. 4 HOURS. Prose writers; reading and analysis of Lesage, Montesquieu, Diderot, Voltaire, Rousseau, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

352. FRENCH LITERATURE OF THE EIGHTEENTH CENTURY II. 4 HOURS. Reading and analysis of major dramatists: Crébillon, Voltaire, Marivaux, Diderot, Beaumarchais, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

353. LITERARY AND INTELLECTUAL CURRENTS OF THE EIGHTEENTH CENTURY. 4 HOURS. Reading and analysis of selected works tracing major literary and intellectual currents; Montesquieu, Voltaire, Rousseau, Diderot, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

354.   THE FRENCH NOVEL OF THE EIGHTEENTH CENTURY. 4 HOURS. Reading and analysis of selected novels of Prévost, Crebillon *fils,* Voltaire, Diderot, Rousseau, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

359.   PREROMANTICISM. 4 HOURS. The Preromantic movement in France from 1761 to 1814. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

360.   *LA BATAILLE ROMANTIQUE.* 4 HOURS. Manifestos, polemical writings, and major literary productions of the period. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

361.   FRENCH ROMANTICISM I. 4 HOURS. Reading and analysis of selected works tracing the main developments in the Romantic movement from 1815 to 1829; Hugo, Stendhal, Mérimée, Lamartine, Vigny, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

362.   FRENCH ROMANTICISM II. 4 HOURS. Reading and analysis of selected works tracing the main developments of the Romantic movement after 1830; Nerval, Baudelaire, Sand, Musset, Hugo, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

363.   THE FRENCH NOVEL OF THE NINETEENTH CENTURY I. 4 HOURS. Reading and analysis of major novelists: Chateubriand, Senancour, Mme. de Staël, Constant, Lamartine, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

364.   THE FRENCH NOVEL OF THE NINETEENTH CENTURY II. 4 HOURS. Reading and analysis of major novelists: Stendhal, Balzac, Mérimée, George Sand, Flaubert, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

365.   THE FRENCH NOVEL OF THE NINETEENTH CENTURY III. 4 HOURS. Reading and analysis of major novelists: the Goncourt brothers, Zola, Maupassant, Loti, France, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

366.   FRENCH POETRY II. 4 HOURS. Major poets of the nineteenth century; Lamartine, Hugo, Musset, Vigny, Gautier, Baudelaire, Verlaine, Rimbaud, Mallarmé, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

368.   MODERN FRENCH DRAMA I. 4 HOURS. Major dramatists of the nineteenth and twentieth centuries; Hugo, Vigny, Musset, Dumas *fils,* Augier, Becque, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

369.   MODERN FRENCH DRAMA II. 4 HOURS. Continues French 368. Curel, Porto-Riche, Rostand, Claudel, Lenormand, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

370.   MODERN FRENCH DRAMA III. 4 HOURS. Continues French 368 and 369. Cocteau, Giraudoux, Anouilh, Sartre, Camus, Beckett, Ionesco, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

371.   FRENCH POETRY III. 4 HOURS. Major poets of the twentieth century; Jammes, Jacob, Apollinaire, Valéry, Eluard, Breton, Aragon, Perse, Michaux, Prévert, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

372.   THE FRENCH NOVEL OF THE TWENTIETH CENTURY I. 4 HOURS. Reading and analysis of selected novels by Gide, Proust, Mauriac, Colette, Cocteau, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

373.   THE FRENCH NOVEL OF THE TWENTIETH CENTURY II. 4 HOURS. Reading and analysis of selected novels by Malraux, Aragon, Saint-Exupery, Céline, Giraudoux, and others. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

374.   THE FRENCH NOVEL OF THE TWENTIETH CENTURY III. 4 HOURS. Reading and analysis of selected novels by Sartre, Camus, Robbe-Grillet, Sarraute, Butor, and other contemporary novelists. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

375.   FRENCH ABROAD. 0 TO 45 HOURS. May be repeated for a maximum of 45 hours of credit. Lectures, seminars, and practical work in French language, literature, and civilization in France. Prerequisites: Fr 201, any one of Fr 202, 203, 204, 205, any three of Fr 211, 212, 221, 222, 3.50 overall average, and 3.50 average in French.

379.   INTRODUCTION TO AFRO-FRENCH LITERATURE. 4 HOURS. Same as Black Studies 379. Selected prose and poetry of sub-Sahara African Francophone literature. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

381.   INTRODUCTION TO LINGUISTICS. 4 HOURS. French phonology, morphology syntax, and semantics in comparison with English. Prerequisites: Fr 212, 222, 281 or the equivalents.

382.   TEACHERS COURSE. 4 HOURS. Resources, classroom materials, standard practices, and problems in the teaching of French; practical application to actual classroom situations. Prerequisite: Fr 381 or consent of the instructor.

390.   PERSPECTIVES IN FRENCH LITERATURE. 4 HOURS. A synthesis of specialized knowledge previously acquired in various areas at the 300 level; a new perspective on French literature in its historical development, presented through representative works by major authors. Prerequisites: Senior standing, Fr 201, and any two of Fr 202, 203, 204, 205.

399.   SEMINAR ON SELECTED TOPICS. 4 HOURS. May be repeated for credit. Specific movements, authors, or works. Topics are announced in the Timetable. Prerequisite: Senior standing and/or consent of the instructor.

Courses for Graduate Students

403.   *EXPLICATION DE TEXTES.* 4 HOURS. Detailed critical and stylistic analysis of selected short pieces of French prose and poetry. Lectures, discussion, and student *explications*. Prerequisite: Fr 301 or 392 or the equivalents.

404.. MODERN FRENCH PHONETICS AND PHONOLOGY. 4 HOURS. One hour per week in the language laboratory. Phonetic description and transcription. Training in diction and interpretation of literary texts. Phonetics as a teaching device. Prerequisite: Fr 301 or 302 or the equivalent.

405. THE TEACHING OF COLLEGE FRENCH. 1 HOUR. May be repeated twice for credit. Required of all graduate teaching assistants. Problems of teaching French at the college level, including classroom procedures and the preparation and grading of tests and final examinations. Prerequisite: Teaching Assistant in French.

406. INTRODUCTION TO OLD FRENCH PHILOLOGY: I PHONOLOGY. 4 HOURS. Phonological development of the French language from classical and vulgar Latin.

415. THE *LIBERTINS* IN THE SEVENTEENTH AND EIGHTEENTH CENTURIES. 4 HOURS. Intensive study of works not usually covered in courses on seventeenth- and eighteenth-century literature. Prerequisites: Fr 341, 351 or the equivalents.

416. STRUCTURES OF FRENCH CULTURE. 4 HOURS. Introduction to the cultural structures that orient French business, government, and political activity: social class, the educational system, bureaucratic centralization, the church.

427. *ROMANTISME SOCIAL.* 4 HOURS. Development of Romantic thought after the Revolution of 1830. Social consciousness of Sand, Hugo, Lamartine, Musset, Vigny. Influence of Leroux and Lamennais.

430. THE USE OF GREEK MYTHOLOGY IN THE CONTEMPORARY FRENCH THEATER. 4 HOURS. Greek tragic vision in the works of Cocteau, Giraudoux, and Anouilh. Prerequisites: Fr 342, 370 or the equivalents.

440. SEMINAR FOR MASTER OF ARTS CANDIDATES. 4 HOURS. May be repeated for credit. Topics are announced each quarter.

490. INDEPENDENT STUDY FOR GRADUATE STUDENTS. 1 TO 8 HOURS. May be repeated for credit up to a maximum of 8 hours. Prerequisite: Consent of the head of the department.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Prerequisite: Approval of the department.

GEOGRAPHY

Clifford E. Tiedemann, Chairman of the Department

Professors: James M. Blaut, Edwin Thomas

Associate Professors: Edwin Draine, Gary L. Fowler, James Landing, David Solzman, Clifford E. Tiedemann

Assistant Professors: Yehoshua S. Cohen, Bruce G. Gladfelter, Albert J. Larson, Siim Soot

The Department of Geography offers work leading to the Master of Arts in two areas of specialization: urban geography and environmental studies. This is an intercampus degree program, offered in cooperation with the Urbana-Champaign campus of the University of Illinois. The typical program, chosen by the student in consultation with a faculty adviser, devotes at least one-fourth of the time to courses directly related to one of these two areas of emphasis. In addition it is assumed that the department electives support the area chosen by the student and that work outside the department complements his work in geography. The required thesis is in the student's area of emphasis.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study and must submit three letters of recommendation. In exceptional cases, students who have averages of less than 4.00 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Applicants who have majored in fields other than geography must remedy deficiencies in their preparation before being granted full standing in the graduate program.

Submission of Graduate Record Examination scores (the verbal and quantitative test and the advanced test in geography) is recommended for applicants with a grade point average of 4.00 or higher and is required for all other applicants.

Degree Requirements

Credit Distribution. A minimum of 48 quarter hours of approved graduate work, of which at least 12 hours must be in 400-level geography courses and 12 hours in individual research activities within the Department of Geography. From 6 to 12 of the 48 quarter hours required for the degree must be earned outside of the Department of Geography in a complementary discipline recognized by the student's permanently assigned adviser and the department's graduate adviser as pertinent to the student's overall program.

Thesis.   Candidates must submit an acceptable thesis. From 8 to 12 quarter hours in Geography 499—Thesis Research may be credited toward the Master of Arts in Geography. The preparation of the thesis will be supervised by the student's faculty adviser, and its final form must be approved by the committee before the comprehensive examination is scheduled.

Comprehensive Examination. A degree candidate must satisfactorily complete an oral comprehensive examination covering his research activities; topics will be selected from the student's area of emphasis and from the overall area of geography.

Should the student fail the comprehensive examination, he will be advised to take additional course work, or undertake independent study, or do further research on his thesis topic to prepare him for a second examination, which is given *no sooner* than the last week of the succeeding term. If the second examination is failed, the student is terminated.

Courses for Graduate and Advanced Undergraduate Students

301. ADVANCED LANDFORM GEOGRAPHY. 4 HOURS. The surficial processes modifying the earth's landforms; the controls over those processes and their regional settings. Prerequisites: Geog 190, 201.

303. PRINCIPLES OF CLIMATOLOGY. 4 HOURS. Climatology; macroclimatology and microclimatology; particular emphasis on fluxes of energy and mass at the interfaces between the earth's surface and the atmosphere. The environment and man, plants, and animals; special emphasis on urban microclimatological problems. Prerequisites: Geog 190, 203.

306. FUNDAMENTALS OF LANDFORM ANALYSIS. 3 HOURS. Theories of landform processes and techniques of analysis. Prerequisite: Geog 101 or GeolS 102.

310. PRINCIPLES OF CULTURAL AREA ANALYSIS. 4 HOURS. Analysis and application of a wide variety of techniques developed to aid in defining, identifying, evaluating, and bounding world cultural areas. Special attention to techniques applicable to urban environments. Examination of development of areal cultural hierarchies through the diffusion mechanisms that create them. Prerequisites: Geog 190, 210.

311. GEOGRAPHY OF POPULATION. 4 HOURS. Broad treatment of the problems created by the changing distributions and numbers of the world's population. Emphasis on the relationships between population and resources; intensive study of the implications for both overpopulated and underpopulated world areas. Prerequisites: Geog 190, 210.

312. GEOGRAPHY OF RELIGIONS. 4 HOURS. Same as Religious Studies 312. Systematic treatment of geographical manifestations of the major religious systems of the world. Special attention to the geographical origins and dispersal mechanisms of religious systems and to the manner in which man organizes his life within the framework of his belief. Intensive study of applications being made in the geographical inquiry on religious systems. Prerequisites: Geog 190, 210.

315. PRINCIPLES OF HISTORICAL GEOGRAPHY. 4 HOURS. Development of an understanding of relating phenomena in space through time. Application of contemporary geographic research methodologies to geographically significant aspects of historic patterns and events. Prerequisites: Geog 190, 215.

320. ETHNOGEOGRAPHY. 4 HOURS. Cross-cultural analysis of environmental behavior and environmental cognition (ethnoscience), of the systems of resource-use in which these processes are imbedded, and of their relationship to cultural change and technological growth. Prerequisites: Geog 220, Anth 200.

326. DECISION-MAKING AND RESOURCE MANAGEMENT. 4 HOURS. The nature of decision-making schema in resource management; intensive study of approaches used in analyzing resource-management decisions; case studies are analyzed in terms of the reflected character of decisions and strategies, with emphasis on environmental hazards. Prerequisites: Geog 190, 226.

330.   LOCATION THEORY AND SPATIAL ANALYSIS. 4 HOURS. Spatial analysis in relation to theories of location of economic activity and regional development; theoretical systems; development and derivation of locational patterns of agricultural, manufacturing, and tertiary activities. Prerequisites: Geog 190 and one course from Geog 230, 231, 233, or 235; or Econ 121 or Mktg 360.

332.   ECONOMIC DEVELOPMENT. 4 HOURS. Same as Economics 334. Basic problems and characteristics of underdeveloped countries; classical, neoclassical, and modern contributions to the theory of development; major proposals for accelerating development; basic approaches to economic development; laissez-faire, interventionism; role and methods of planning; foreign aid; economic integration. Prerequisite: Econ 319 or 320 or 321 or Geog 330, Econ 121. Business administration students must have declared a major.

333.   URBAN ECONOMICS. 4 HOURS. Same as Economics 332. Survey of economic problems of cities; the nature and function of cities; the demand for and supply of housing and urban land; the implications of location theory for the spatial pattern of cities; the impact of government programs. Prerequisite: Econ 318 or 321 or Geog 330. Business administration students must have declared a major.

334.   REGIONAL ECONOMICS. 4 HOURS. Same as Economics 342. Theory of location of economic activity, land use patterns, systems of cities, the spatial pattern of city regions, regional growth dynamics, interregional transactions analysis, spatial mobility of factors, regional income differences, regional welfare and policy. Prerequisites: Econ 320 and either 319 or 321; or Geog 190, 230. Business administration students must have declared a major.

335.   GEOGRAPHICAL MODELING OF TRANSPORTATION SYSTEMS. 4 HOURS. Discussion of the principles of spatial interaction; emphasis on commodity flows and passenger movements, the practicality of network analysis, and the impact of transportation facilities on land use and regional development. Techniques include simulation and evaluation of existing transportation systems and solutions to theoretical transportation problems. Prerequisite: Geog 235 or 383.

350.   AREAL ORGANIZATION OF INTRA-URBAN SYSTEMS. 4 HOURS. Geographic aspects of intracity relationships. Topics include the city as a complex man-machine system and areal patterns of urban growth and development within the context of cross-sectional and longitudinal models. Prerequisites: One upper-division research methods course, one two-course systematic sequence, and one course in either the 250 or the 360 series.

351.   AREAL ORGANIZATION OF INTERURBAN SYSTEMS. 4 HOURS. Geographic aspects of intercity relationships. Topics include patterns of intercity flows and development, continuous and hierarchical ordering of urban places, measurement of areal alignments, and the theoretical implications of different types of areal patterns. Prerequisites: One upper-division research methods course, one two-course systematic sequence, and one course in either the 250 or the 360 series.

361.   PROBLEMS OF THE HUMID TROPICS. 4 HOURS Natural and human aspects of tropical areas; problems of the humid environment relating to landforms, land use, resources, economic and social phenomena and institutions; emphasis on the development potential of humid, tropical lands. Individual research projects are assigned. Prerequisites: One upper-division research methods course, one two-course systematic sequence, and one course in either the 260 or the 350 series.

362. PROBLEMS OF ARID REGIONS. 4 HOURS. Natural and human aspects of arid areas; problems of the environment relating to landforms, land use, resources, and economic and social phenomena and institutions; emphasis on the development potential of arid lands. Individual research projects are assigned. Prerequisites: One upper-division research methods course, one two-course systematic sequence, and one course in either the 260 or the 350 series.

365. INTERREGIONAL EXCHANGE DYNAMICS. 4 HOURS. Spatial analysis of the economic, social, and political facts that have resulted from, and in, human and commodity flows among regions; special attention to the important relationships resulting from regional differences. Prerequisites: One upper-division research methods course, one two-course systematic sequence, and one course in either the 260 or the 350 series.

369. FIELD GEOGRAPHY OF SELECTED WORLD REGIONS. GRADUATE STUDENTS, 6 HOURS; UNDERGRADUATE, 12 HOURS. May be applied only once toward degree requirements. A full-quarter field course covering a selected geographic region of the world. Lectures, discussions, special readings, projects, and field work. Prerequisites: *Geography majors:* Geog 190, two 200-level systematic geography courses, and consent of the instructor. *Others:* One year of upper-level social science courses and consent of the instructor.

370. THE LEARNING AND TEACHING OF GEOGRAPHY. 4 HOURS. A formal approach to instructional strategies in geography centered upon the known behavioral and learning characteristics of students. Strong emphasis on material presentation in contemporary urban schools. Prerequisites: Senior standing and declared major in teacher education.

381. GEOGRAPHIC INFORMATION SYSTEMS I. 4 HOURS. Problems encountered in the gathering and use of geographic data and the structuring of research in relation to existing relevant theory, measurement systems capabilities, and recognized objectives of research activities. Topics include review of data sources, methods of measurement, sampling models, and problems of dealing with aggregated reporting units, records matching, and missing data. Prerequisites: Geog 182, 190 (or Math 117, or Soc 185, or QM 272), one 12-hour introductory sequence, and one 8-hour systematic sequence.

382. GEOGRAPHIC INFORMATION SYSTEMS II. 4 HOURS. Application of inferential statistical techniques and probability models in geographic research. Topics include use of descriptive parameters in recognizing geographic relationships, tests of significance, and recognition of particular areal patterns. Prerequisite: Geog 381.

383. GEOGRAPHIC INFORMATION SYSTEMS III. 4 HOURS. Problems encountered in the management and portrayal of geographic data. Topics include preparation of data for manual and machine processing, data condensation and characterization, observation indexing, and the preparation of graphic and tabular displays. Prerequisite: Geog 382.

385. THEMATIC CARTOGRAPHY. 4 HOURS. Discussion and experiments involving graphic representation of real-world areal patterns; preservation of geodetic and information properties; information generalization and reconstruction; semiotic problems and communications capabilities of mapped informational displays. Prerequisites: Geog 285 or 382 and consent of the instructor.

386.   INTRODUCTION TO AREAL PATTERNS. 4 HOURS. The characteristics and evaluation of selected real-world patterns. Application of the concepts of randomness and interdependence to the problem of understanding certain of the physical and cultural processes affecting the arrangement of objects in the landscape. Prerequisites: Geog 286 or 382 and consent of the instructor.

387.   REMOTE SENSING OF THE ENVIRONMENT. 4 HOURS. Principles and practice in interpretation of aerial photographs, radar, and infrared imagery. Knowledge of elementary physics and geometry is recommended. Prerequisite: Geog 287.

391.   REVIEW OF GEOGRAPHIC THOUGHT AND RESEARCH METHODS. 4 HOURS. Introduction to the theory and techniques of geographic research; modern geographic philosophy; interpretative analysis of bibliographic sources and the preparation of a bibliography; preparation and evaluation of individual papers on selected topics. Prerequisites: Two two-course systematic sequences, one upper-division research methods course, one 300-level urban or regional course, and consent of the instructor.

Courses for Graduate Students

401.   TOPICS IN GEOMORPHOLOGY. 3 HOURS. May be repeated up to a maximum of 9 hours with alternate themes. The general area of interest is defined by the instructor; students select a specific aspect to be defined, researched, and discussed. Emphasis on individual effort and participation. Prerequisites: Geog 301 and consent of the instructor.

403.   SEMINAR ON MICROCLIMATOLOGY. 3 HOURS. May be repeated for up to a maximum of 9 hours of credit. Review and verification of recent findings and reports of research in the significance of the availability of energy, moisture, and various pollutants in the lower atmosphere and their ecological effect. Emphasis on the urban climatic pattern. Prerequisite: Geog 303.

410.   SEMINAR ON SOCIAL AND CULTURAL GEOGRAPHY. 3 HOURS. May be repeated up to a maximum of 9 hours. A research course in the analysis of the mechanisms of cultural change with spatial impact. Emphasis on the identification of trait and culture complexes that result in differentially organized areas and the diffusion mechanisms that either accelerate or retard such development. Prerequisite: Geog 310.

415.   SEMINAR ON HISTORICAL GEOGRAPHY. 3 HOURS. May be repeated up to a maximum of 9 hours. A research course in the development of expertise in the techniques of analysis through the integration of history and geography. Methodology is centered on macrostudies (evolutionary perspectives on the development of spatial patterns in large areas) and microstudies (small-scale studies of areas or groups). Prerequisite: Geog 315.

426.   SEMINAR ON MANAGEMENT AND CONSERVATION OF RESOURCES. 3 HOURS. May be repeated up to a maximum of 9 hours. The role of perception of the environment in resource management. Special attention to geographical research on perception of natural hazards. Needs for further research are examined. Prerequisite: Geog 326.

430.   SEMINAR ON SPATIAL ECONOMIC ANALYSIS. 3 HOURS. Selected theories of location of economic activities and regional growth and development. Topics may include the location of agricultural, manufacturing, and tertiary activities. Primarily economic geography: findings in conventional economic theory and in regional economics; impact on location and on development of behavior of firms and institutions. Topics vary each quarter. Prerequisite: Geog 330.

435.   SEMINAR ON URBAN TRANSPORTATION SYSTEMS. 3 HOURS. May be repeated up to a maximum of 9 hours. Evaluation of the impact of public and private transit on city land-use structure; review of the degree to which the transit facilities serve the population. Metropolitan transportation systems are contrasted with the social, economic, and ethnic structure of urban areas. Analysis includes practical and theoretical models. Prerequisites: Geog 335, 351 or the equivalents.

450.   TOPICS IN URBAN GEOGRAPHY. 3 HOURS. May be repeated for up to 9 hours of credit. The areal organization of metropolitan communities; emphasis on geographic patterns of activities within the city. Geographic aspects of an urban system, with emphasis on the integrating and specialization factors that affect the American urban system. Prerequisites: Geog 350, 351.

459.   SEMINAR ON URBAN GEOGRAPHY. 3 HOURS. May be repeated up to a maximum of 9 hours. Topics vary from term to term. Prerequisite: Geog 450.

460.   CONCEPTS OF REGIONAL GROWTH AND DEVELOPMENT. 3 HOURS. The concept of a region. Interregional income differentials. Factor mobility, determinants of regional growth, regional development strategies. Prerequisites: Geog 361 and 362 or credit in one and concurrent registration in the other.

469.   SEMINAR ON REGIONAL DEVELOPMENT. 3 HOURS. May be repeated up to a maximum of 9 hours. Analysis of the role of resources in regional development, with emphasis on integrated river-basin development. Specific topics may change from year to year. Prerequisite: Geog 460.

470.   SEMINAR ON GEOGRAPHIC LEARNING. 3 HOURS. May be repeated up to a maximum of 9 hours. Research course involving applications of modern learning theory to the teaching of geographic concepts. Emphasis on teaching techniques that will maximize geographic information flow with minimal energy expenditure for both student and teacher. Experience with learners at various levels is an integral part of the work. Prerequisite: Geog 370.

481.   SPATIAL ANALYSIS IN GEOGRAPHY. 3 HOURS. May be repeated up to a maximum of 9 hours. The role of hypothesis testing in geographic research. Methods of testing spatial associations, ranging from simple correlation to generalized mapping surfaces. Emphasis on residual analysis and the related problems of autocorrelation and varying unit size. Prerequisites: Geog 381, 382, 383 or the equivalents.

490.   GEOGRAPHIC FIELD RESEARCH METHODOLOGY. 4 HOURS. A problem-oriented introduction to primary data collection in geographic research. Group and individual involvement in formulation and analysis of small-area research problems. Written and oral reports on individually assigned projects are evaluated by a faculty committee. Several all-day field trips are required. Prerequisite: Credit or concurrent registration in Geog 391.

492. FRONTIERS IN GEOGRAPHIC RESEARCH. 2 HOURS. Required of all graduate geography majors. A formal, intensive examination of contemporary geographic research in the various subfields of the discipline. Prerequisites: Geog 391, 490.

494. SPECIAL READINGS IN GEOGRAPHY. 1 TO 4 HOURS. May be repeated up to a maximum of 8 hours. Independent readings on an approved topic for those desiring further acquaintance with advanced thought and methodology in geography without involvement in a research project or a field study. Prerequisite: Approval of the department student adviser.

495. SPECIAL STUDIES IN GEOGRAPHY. 1 TO 4 HOURS. May be repeated for credit up to a maximum of 8 hours. Independent research on an approved topic not related to thesis preparation. Prerequisite: Approval of the department student adviser.

499. THESIS RESEARCH IN GEOGRAPHY. 0 TO 16 HOURS. May be repeated for credit up to a maximum of 16 hours. Independent research on a topic approved for a graduate thesis. Prerequisite: Approval of the appropriate department committee.

GEOLOGICAL SCIENCES

Professors: Werner H. Baur, Head of the Department; Joseph I. Lipson, Richard B. McCammon, Edward Olsen (Adjunct, Field Museum)

Associate Professors: Robert E. DeMar, Warren C. Forbes, Jr., Kelvin S. Rodolfo, Norman D. Smith

Assistant Professors: David W. Baker, John R. Bolt (Adjunct, Field Museum), Aijaz A. Khan, August F. Koster Van Groos, Zubair A. Saleem

Areas of study in the department are crystallography, environmental geology, geochemistry, hydrology, mineralogy, oceanography, paleontology, petrology, sedimentology, and structural geology.

Admission Requirements

Geology students with strong backgrounds in biology, chemistry, mathematics, and physics and engineers with strong backgrounds in hydrology and soil mechanics are encouraged to apply, although students who have degrees in other sciences or engineering fields are considered.

Applicants are considered on an individual basis. They must have a baccalaureate in geology, engineering, or related fields from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study and must submit three letters of recommendation, preferably from professors familiar with their academic work, and Graduate Record Examination (quantitative and verbal test) scores. In exceptional cases, students who have averages of less than 4.00 but above 3.50 or practicing geoscientists and engineers who wish to return to school for graduate instruction may be

admitted if they can show evidence of substantial promise of ability to complete the program successfully. Depending on their qualifications and background, such students may be admitted on limited status and will be required to remedy department deficiencies before being admitted to regular status.

The department offers graduate work leading to the Master of Science and, in cooperation with the Departments of Energy and Materials Engineering, advanced work in geotechnical engineering and geosciences leading to the Doctor of Philosophy in Engineering. The student's program is determined by his area of specialization and is worked out in consultation with his adviser.

Degree Requirements

Master of Science

Hours. 48 quarter hours, 24 of which must be in the area of concentration, which may, as in evolutionary paleontology, for example, span several academic disciplines. A minimum of 16 quarter hours must be taken in 400-level courses, 8 of them in the area of concentration.

Thesis. The student must complete a thesis involving 8 quarter hours of work in a research project selected with the approval of his faculty supervisor. The department may request the student to take a comprehensive examination in his area of specialization. The thesis is evaluated by a department committee that may include one member selected from outside the faculty of Chicago Circle.

Candidates must demonstrate competence in reading the scientific literature of at least one foreign language. French, German, and Russian are the preferred languages.

Doctor of Philosophy

To become a candidate for the doctorate, a student must pass a qualifying examination to be taken within one quarter of the completion of the requirements for an MS. If the student has an MS from another institution or department, he must take his qualifying examination within two quarters of his admission as a graduate student. It may be retaken once if so recommended by the examination committee.

Approximately 48 quarter hours of course work beyond the MS (or the equivalent) are required. Toward the end of his course work, the student is required to pass a preliminary examination administered by a faculty committee.

A major requirement of the PhD program is the completion of a thesis based on original research, which is carried out and the thesis written under the supervision of a faculty committee of at least five members. The thesis must be defended before the committee and the public in an examination, notice of which appears in an official campus publication.

The number of credit hours required for the doctoral thesis is flexible and is adjustable in accordance with the regulations of the Graduate College.

Although formal thesis research often does not start until completion of the preliminary examination requirements, it is also common to initiate an informal research program while the student is still involved in course work.

Foreign language proficiency is not required.

Courses for Graduate and Advanced Undergraduate Students

300.   MINERALOGY. 4 HOURS. Crystal chemistry and phase equilibria of minerals and mineral assemblages. Prerequisites: Chem 114, GeolS 210.

310.   IGNEOUS AND METAMORPHIC PETROLOGY. 4 HOURS. Discussion of petrogenesis; application of thermodynamic principles to the crystallization of rocks. Prerequisites: Chem 114, GeolS 210.

315.   SEDIMENTOLOGY. 4 HOURS. Composition, texture, and structures of sediments and sedimentary rocks. Environmental factors that control sediment genesis. Theory and techniques of modern sedimentology. Prerequisites: Chem 114, GeolS 215, and credit or registration in Math 131.

316.   INVERTEBRATE PALEONTOLOGY. 4 HOURS. Same as Biological Sciences 316. Phylogeny, morphology, and ecology of the fossil invertebrates. Prerequisites: GeolS 218 and consent of the instructor.

318.   VERTEBRATE PALEONTOLOGY. 4 HOURS. Same as Biological Sciences 318. Phylogeny, morphology, and ecology of the fossil vertebrates. Prerequisites: BioS 281 and consent of the instructor.

319.   PALEOBOTANY. 5 HOURS. Same as Biological Sciences 319. Structure, phylogeny, and stratigraphic distribution of representative fossil plants. Lecture, laboratory, and field trips. Prerequisite: One year of biological sciences.

320.   ANALYSIS OF GEOLOGIC STRUCTURES. 4 HOURS. Elementary stress and strain relations for earth materials. Nature and origin of folds and faults. Structural petrology. Deformation of the earth's crust. Prerequisites: Math 130 and credit or registration in Phys 101 or 111.

330.   ENVIRONMENTAL GEOLOGY. 4 HOURS. Geological aspects of man's environment; emphasis on the earth's processes, resources, and physical properties of rocks and soils insofar as they are important to or in some way affect human activities. Prerequisites: Credit or concurrent registration in Math 132, GeolS 225.

335.   GEOCHEMISTRY. 4 HOURS. Principles of the distribution of the elements in the earth's crust. Element partitioning between coexisting minerals; origin of the elements. Introduction to thermodynamic consideration of mineral equilibria. Prerequisite: Chem 114.

337.   ELECTRON MICROPROBE ANALYSIS. 4 HOURS. Principles and techniques. Prerequisite: Phys 114 or the equivalent.

345.   ADVANCED CRYSTALLOGRAPHY. 4 HOURS. Crystalline properties of minerals. Theory and practice of determining the crystalline structure of minerals. Prerequisite: GeolS 300.

350.   HYDROGEOLOGY. 4 HOURS. The occurrence, storage, movement, and quality of water in rocks of the earth's crust. Prerequisite: Math 132.

360.   INTRODUCTORY GEOPHYSICS. 4 HOURS. The shape and figure of the earth, gravity, seismology, and magnetism. Thermodynamics of the earth; atmospheric and planetary geophysics. Prerequisite: Consent of the instructor.

365.   STATISTICAL METHODS IN GEOLOGY. 4 HOURS. Introductory course. Sampling from geological populations, statistical inference, and hypothesis testing; statistics of orientation data; trend surface methods; multivariate correlation techniques; time series analysis. Prerequisite: Math 370.

370.   ENGINEERING GEOLOGY. 4 HOURS. Applications of geology to major engineering problems and operations. Prerequisites: Math 132, Phys 112.

375.   COMPUTER APPLICATIONS IN GEOLOGY. 4 HOURS. An introduction. Machine contouring, trend surface analysis, and spatial filtering. Graphic correlation, factor analysis, and classification systems. Simulation of geological processes, geologic sampling, and spatial variation. Prerequisite: Math 195.

380.   EARTH SCIENCE FOR TEACHERS. 9 HOURS. Survey of the earth sciences; particular attention to the Earth Science Curriculum Project (ESCP) materials. Emphasis on the interdisciplinary nature of an investigative approach to earth science. Prerequisites: Bachelor's degree in science or mathematics, enrollment in NSF In-Service Institute for Secondary School Teachers, and consent of the instructor.

385.   GEOPHYSICAL EXPLORATION. 4 HOURS. Introduction to methods of geophysical exploration. Interpretation of seismic data, gravity and magnetic anomalies, and electrical and electromagnetic surveys. Laboratory includes field investigations. Prerequisites: Math 133, GeolS 360.

390.   TOPICS IN MODERN GEOLOGY. 4 HOURS. Discussion of current research topics. Prerequisites: Senior standing and 20 hours of advanced courses in geological sciences.

Courses for Graduate Students

410.   ADVANCED PETROLOGY. 4 HOURS. May be repeated for credit. Selected topics, generation and properties of magmas, formation of metamorphic rocks. Reaction rates in metamorphic rocks. Prerequisites: GeolS 310 and consent of the instructor.

413.   PROBLEMS IN EVOLUTIONARY PALEONTOLOGY. 4 HOURS. Same as Biological Sciences 413. Seminar on current problems. Discussion of evidence and mechanisms of change, such as rates of evolution, population structure, and extinction as shown by the vertebrate fossil record. Prerequisite: Consent of the instructor.

415.   ADVANCED SEDIMENTOLOGY. 4 HOURS. May be repeated. Advanced topics in one of the following: clastic sedimentation models, carbonate sedimentology, sediment transport and sedimentary petrology. Lectures, seminar, and laboratory. Prerequisites: GeolS 315 and consent of the instructor.

420.   ADVANCED VERTEBRATE PALEONTOLOGY. 4 HOURS. May be repeated twice for credit. Same as Biological Sciences 420. Given as three different courses.

Advanced treatment of the functional morphology, paleoecology, and phylogeny of the various vertebrate groups: fishes, amphibians and reptiles, and mammals. Prerequisites: BioS 282, GeolS 318.

430. ADVANCED MINERALOGY. 4 HOURS. May be repeated if the same topic is not covered twice. Various topics in one of the following categories: structural mineralogy, X-ray crystallography, optical properties of minerals, and crystal chemistry and mineral synthesis. Lectures, seminars, and laboratory. Prerequisites: GeolS 206 and consent of the instructor.

432. ADVANCED GEOCHEMISTRY. 4 HOURS. May be repeated if the same category is not covered twice. Advanced topics in one of the following categories: isotope geochemistry and geochronology, distribution of elements in the earth's crust, mineral systems with and without volatile components, and low-temperature mineral systems. Lectures, seminars, and laboratory. Prerequisites: GeolS 335 and consent of the instructor.

440. ADVANCED GROUND-WATER HYDROLOGY. 4 HOURS. May be repeated if the same topic is not covered twice. Selected topics in ground-water hydrology. Prerequisites: GeolS 350 and credit or concurrent registration in Math 220.

460. MARINE GEOLOGY. 4 HOURS. Origin and nature of marine sediments, tectonics and geomorphology of the ocean floor, including methods of mapping and measuring submarine topography. Prerequisite: Consent of the instructor.

495. ADVANCED STUDIES IN GEOLOGY. 2 TO 8 HOURS. May be repeated twice. Independent study or research, under a faculty supervisor, culminating in a written report. Work may be taken in the following fields: stratigraphy, sedimentation, paleontology and paleoecology, vertebrate paleontology, mineralogy and petrology, crystallography, geochemistry, engineering geology, oceanography. Prerequisites: Consent of the head of the department and the faculty member who will supervise the study.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Individual work under the supervision of faculty members in their respective fields. Prerequisites: Consent of the thesis supervisor and the head of the department.

GERMAN

Professors: Robert R. Heitner, Head of the Department; Lee B. Jennings, Robert Kauf, Daniel C. McCluney, Jr., Leroy R. Shaw, Elizabeth Teichmann, Hazel C. Vardaman

Associate Professors: Arnold J. Hartoch, Karl F. Otto, Jr., Marilyn J. Torbruegge, Ernest S. Willner

Assistant Professors: Heinz C. Christiansen, John S. Groseclose, Rudolph A. Hofmeister, Dennis Q. Taylor, David M. Weible

Work leading the the Master of Arts is offered in two areas of specialization: German literature and German philology and linguistics. In addition, the department participates in an intercampus program with the Department of German on the Urbana-Champaign campus of the University

of Illinois that offers work leading to the Doctor of Philosophy in German. Students admitted to this program will be required to take at least one semester of full-time academic work on the Urbana-Champaign campus.

Admission Requirements

Applicants are considered on an individual basis. However, an applicant must have a bachelor's degree with a major in German from an accredited institution or the equivalent from a foreign university. Those whose undergraduate preparation in German is deemed inadequate may be admitted at the discretion of the department but will be required to take supplementary course work on the undergraduate level. Applicants are expected to have a grade point average of 4.00 (A=5.00) in undergraduate work in German; those who have averages between 3.50 and 4.00 may be considered, if they can show evidence of substantial promise of ability to complete the program successfully.

Degree Requirements

Program A *(A thesis is not required)*
1. A minimum of 48 hours of course work, including at least 36 hours in the major field, 18 of which must be in 400-level courses.
2. At least one graduate seminar in German.
3. A one-hour oral examination and a three-hour written comprehensive examination.

Program B *(A thesis is required.)*
1. A minimum of 36 quarter hours of course work, including at least 24 hours in the major, 18 of which must be in 400-level courses.
2. At least one graduate seminar in German.
3. A master's thesis.

Courses for Graduate and Advanced Undergraduate Students

320. WRITING AND SPEAKING GERMAN V. 4 HOURS. Prerequisite: Ger 204 or the equivalent.

321. WRITING AND SPEAKING GERMAN VI. 4 HOURS. Prerequisite: Ger 320 or the equivalent.

370. THE GERMAN *NOVELLE*. 4 HOURS. Reading and interpretation of representative *Novellen* of the nineteenth and twentieth centuries. Prerequisites: Ger 221 and two additional German literature courses.

372. GERMAN DRAMA. 4 HOURS. Development from the Enlightenment to the present. Prerequisites: Ger 321 and two additional German literature courses.

374. POETRY FROM THE SEVENTEENTH CENTURY TO THE PRESENT. 4 HOURS. Prerequisites: Ger 221 and two additional German literature courses.

380. GOETHE'S *FAUST*. 4 HOURS. Intensive study of Parts I and II. Prerequisites: Ger 221 and two additional German literature courses.

382. GERMAN LITERATURE TO 1750. 4 HOURS. Prerequisites: Ger 221 and two additional German literature courses.

385. GERMANIC LINGUISTICS. 4 HOURS. Linguistic geography, *Sprachschichten,* and principles of structural linguistics. Prerequisite: Ger 203 or the equivalent.

390. TOPICS IN GERMAN LITERATURE. 4 HOURS. May be taken more than once for credit. Reading and discussion of the work of one prominent German author or of a group of related authors. Subject varies and is chosen by the instructor. Prerequisites: Ger 290, 292, 294.

Courses for Graduate Students

404. THEORIES OF GERMAN PHONETICS AND PHONOLOGY. 4 HOURS. Introduction to phonological and phonetical analysis of the German language. Prerequisite: Consent of the instructor.

405. HISTORY OF THE GERMAN LANGUAGE. 4 HOURS. Structural and lexical development.

407. TEACHING METHODS FOR GRADUATE ASSISTANTS. 1 HOUR. May be repeated twice for credit. Prerequisite: Appointment as a teaching assistant in German.

408. BIBLIOGRAPHY AND RESEARCH METHODS. 4 HOURS.

410. MIDDLE HIGH GERMAN. 4 HOURS.

420. MEDIEVAL LITERATURE. 4 HOURS. German literature from 1100 to 1400. Prerequisites: Ger 382 and 410 or the equivalents.

421. RENAISSANCE AND REFORMATION LITERATURE. 4 HOURS. Prerequisite: Ger 382 or the equivalent.

422. BAROQUE LITERATURE. 4 HOURS. Prerequisite: Ger 382 or the equivalent.

423. ENLIGHTENMENT AND *STURM UND DRANG* LITERATURE. 4 HOURS.

425. GOETHE AND SCHILLER—THE WEIMAR PERIOD. 4 HOURS.

426. ROMANTICISM. 4 HOURS. Literature, theories, and philosophy of eighteenth- and nineteenth-century German Romanticism.

427. POETIC REALISM. 4 HOURS. German literature between Romanticism and Naturalism.

428. MODERN GERMAN LITERATURE FROM 1890 TO 1930. 4 HOURS.

429. CONTEMPORARY LITERATURE. 4 HOURS. German drama, lyric and narrative prose from 1930 to the present.

432. OLD HIGH GERMAN. 4 HOURS. Introduction to sounds, morphology, and syntax. Reading of Old High German literary texts. Prerequisite: Ger 405.

433. OLD SAXON. 4 HOURS. Introduction to sounds, morphology, and syntax. Reading of Old Saxon literary texts. Comparison of Old Saxon, Old English, and Old High German. Prerequisite: Ger 405.

434. GOTHIC. 4 HOURS. Introduction to sounds, morphology, and syntax. Reading of Gothic literary texts. Prerequisite: Ger 405.

436. INTRODUCTION TO OLD NORSE. 4 HOURS. Same as English 406. The grammar of Old Norse and the reading of selected prose and poetry. Prerequisite: A reading knowledge of some other older Germanic dialect such as Old English, Old Saxon, or Gothic.

440. SEMINAR ON LITERATURE. 4 HOURS. May be repeated for credit. Topics vary. Prerequisite: Consent of the instructor.

441. SEMINAR ON LINGUISTICS. 4 HOURS. May be repeated for credit. Topics vary. Prerequisite: Consent of the instructor.

447. LABORATORY MEASUREMENT OF PHONETICS. 4 HOURS. Electroacoustic analysis of spoken German by means of special instruments for automatic graphic recording in the German Linguistic Research Laboratory. Prerequisites: Ger 404 and consent of of the instructor.

448. THE STRUCTURE OF MODERN GERMAN. 4 HOURS. Structural analysis of modern High German by means of modern European and American methods. Prerequisites: Ger 385, 405.

490. INDEPENDENT STUDY FOR GRADUATE STUDENTS. 1 TO 4 HOURS. Prerequisite: Consent of the instructor.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Prerequisite: Approval of the department.

HISTORY

Ronald P. Legon, Chairman of the Department

Professors: Shirley A. Bill, Peter J. Coleman, Bentley B. Gilbert, Louis Gottschalk (Adjunct), Robert L. Hess, Richard Jensen, Peter d'A. Jones, Stanley Mellon, Robert L. Nicholson, Gilbert Osofsky, Robert V. Remini, Max Savelle (Visiting), Edward C. Thaden, John B. Wolf

Associate Professors: Robert E. Conrad, James E. Cracraft, Gerald Danzer, Carolyn A. Edie, Melvin G. Holli, George Huppert, David P. Jordan, Ronald P. Legon, Peter R. McKeon, Richard Millman, Leo Schelbert

Assistant Professors: Richard M. Fried, William A. Hoisington, Richard Levy, Herman Ooms, Michael Perman, James J. Sack (Visiting)

The Department of History offers work leading to the Master of Arts and the Doctor of Philosophy.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university, a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study, and either an undergraduate major in history or a minimum of 24 quarter hours in history. Students who have averages below 4.00 but above 3.75 may be considered. Three letters of recommendation from former professors and a minimum of two years of undergraduate training in a foreign language are required. Students are urged to take the Graduate Record Examination, although it is not required. Applicants who do not have an adequate background must remedy deficiencies in their preparation before being granted full standing in the graduate program. All master's candidates are required to register for a minimum of 8 credit hours per quarter. (Full time is defined as 12 or more quarter hours.)

Degree Requirements

Master of Arts

The candidate must pass a comprehensive examination in one major field of specialization selected from among the following: the ancient world, medieval Europe, Russia, Great Britian, Latin America, the United States, or Africa, with others by petition. Two minor fields must be chosen from a list of seventy or, in special cases, by petition. The candidate is expected to take at least 12 hours in each of two of these fields of specialization. A minimum of 48 quarter hours is required for the degree, 16 of which must be at the 400 level. Of these 16 hours, 12 must be in history courses. A student who has done graduate work in a recognized institution without receiving a degree may petition to receive credit by examination. A thesis is not required. The candidate must pass a reading examination in a foreign language relevant to his program of study and approved by the department. For work in certain fields, a reading knowledge of the particular language or languages relevant to that field may be required.* With the approval of the department, a student may take a minor in another discipline.

The candidate must maintain an average of at least 4.00. Credit toward the degree is not given for any course in which the student receives a grade of less than B.

Master of Arts Program for Teachers

The Master of Arts in History includes a special program designed to meet the needs of high school and junior college teachers. It provides a wide exposure to history, an understanding of historical methodology and practice, and preparation in a field outside history. The program emphasizes the development of teaching strategies and instructional materials. A person who enters the program without professional certification for high school teaching

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*Students who expect to transfer to another school to continue graduate work beyond the MA are advised to check the foreign language requirements of that school.

may gain certification through additional work. Such arrangements must be made in advance. Part-time study is permitted in this program.

The candidate must present 48 hours of course work and pass written examinations in a major field and two minor fields. The major field may be selected from the following: the ancient world, medieval Europe, early modern Europe, modern Europe, Russia, Great Britain, Asia, Africa, United States, Latin America, or world history. The minor fields, one of which is ordinarily taken outside the department, are developed in consultation with an adviser. A candidate normally takes at least 12 hours in each of his fields. In addition, he must present 12 hours of work in a special colloquium in America, European, and world history. Candidates are required to take 12 hours in history at the 400 level. A thesis is not required. There is no language requirement. A student who has done graduate work in a recognized institution without receiving a degree may petition to receive credit for that work. The candidate must maintain an average of at least 4.00. Credit toward the degree is not given for any course in which the student receives a grade of less than B.

Doctor of Philosophy

The department offers work leading to the doctorate in European and in American history.

The doctorate in history indicates mastery of several general areas of historical knowledge and calls for an original contribution to scholarship through independent study and research. Ordinarily, the candidate completes a minimum of 48 quarter hours of graduate courses and seminars beyond the master's degree.

The requirement of the Graduate College for the doctorate is 96 quarter hours of work beyond the Master of Arts. A student may expect to enroll for approximately 48 quarter hours of thesis research.

Unless the candidate holds a Master of Arts from the University of Illinois at Chicago Circle or from some other accredited institution and has been recommended for further advanced study, he is expected to take a qualifying examination for the MA. The candidate for the degree must also stand for oral and written preliminary examinations. Finally, he must present an acceptable dissertation and defend it in a final oral examination.

All new applicants for the PhD at Chicago Circle are evaluated by relevant professors after the completion of the first quarter. The department may require a student to take an oral examination at that time.

All PhD candidates must have a reading knowledge of two foreign languages. In many fields of history, command of a foreign language is indispensable for advanced study and research, and it is expected that that language will be used in course and seminar work as required. In some fields it is recognized that other tools, such as statistical theory, may be equally indispensable.

The program of study for each candidate is fixed by the candidate and his adviser with the approval of the graduate advisory committee of the Department of History.

Candidates must offer one major field of preparation and three minor fields, one of which may be outside the department, for the preliminary examinations. Two of the minor fields must be either geographically or

chronologically outside the areas of his major field. The major fields of study offered by the department are: European history from 1450 to 1815, European history since 1648, American history from 1500 to 1877, American history since 1765, Russian history, British history since 1485, modern Italian history, and French history, with others by petition. Minor fields are to be selected from a list of more than forty regularly offered; in special cases, other fields may be approved on petition to the department. The work that a candidate may offer in other departments is determined in consultation with his adviser.

Urban Studies and Negro History. Graduate students have an opportunity to pursue research in American urban studies and Negro history in the University's Urban History Manuscript Collection, a rich repository of materials dealing with the social, economic, and political history of the United States and particularly with the history of the metropolitan Chicago area. Through the materials in this collection, students in history are trained in the use of manuscripts as well as other primary materials employed in the study and writing of history.

Courses for Graduate and Advanced Undergraduate Students

Note: Graduate students must have background or training appropriate to the content of any 300-level course.

302.   TOPICS IN GREEK HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of ancient history.

303.   TOPICS IN ROMAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of ancient history.

306.   TOPICS IN MEDIEVAL HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of medieval history.

309.   TOPICS IN THE RENAISSANCE. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

311.   TOPICS IN SIXTEENTH-CENTURY EUROPEAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

312.   TOPICS IN SEVENTEENTH-CENTURY EUROPEAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

313.   TOPICS IN EIGHTEENTH-CENTURY EUROPEAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

314.   TOPICS IN NINETEENTH-CENTURY EUROPEAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

316.   TOPICS IN TWENTIETH-CENTURY EUROPEAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

318.   TOPICS IN GERMAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

321.   TOPICS IN BRITISH HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

324.   TOPICS IN FRENCH HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

329.   TOPICS IN ITALIAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

333.   TOPICS IN EASTERN EUROPEAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

335.   TOPICS IN RUSSIAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of European history.

341.   TOPICS IN AFRICAN HISTORY. 4 HOURS. Study in depth of specific problems of internal African history, with concentration on such topics as the African role in the slave trade, the growth and decline of African states, African syntheses with European culture, or the African reaction to European domination and conquest. Prerequisite: 4 hours of African history.

351.   TOPICS IN COLONIAL AMERICAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of United States history.

352.   TOPICS IN REVOLUTIONARY AND EARLY NATIONAL UNITED STATES HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of United States history.

353.   TOPICS IN NINETEENTH-CENTURY UNITED STATES HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of United States history.

354.   TOPICS IN TWENTIETH-CENTURY UNITED STATES HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of United States history.

355.   TOPICS IN THE HISTORY OF CHICAGO. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: Hist 225 or 256.

361.   TOPICS IN LATIN AMERICAN HISTORY. 4 HOURS. May be repeated for credit. Same as Latin American Studies 361. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

371.   TOPICS IN EAST ASIAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of East Asian history.

380.   TOPICS IN ECONOMIC HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of economic history.

381.   TOPICS IN SOCIAL HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

382.   TOPICS IN MIGRATION HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

383.   TOPICS IN THE HISTORY OF PUBLIC POLICY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of United States history.

386.   TOPICS IN RACE, ETHNIC, AND MINORITY HISTORY. 4 HOURS. May be repeated for credit. Same as Black Studies 386. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

389.   TOPICS IN LATER URBAN HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

390.   TOPICS IN DIPLOMATIC HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

391.   TOPICS IN CONSTITUTIONAL HISTORY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

392.   TOPICS IN INTELLECTUAL HISTORY 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

393.   TOPICS IN HISTORIOGRAPHY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

395.   TOPICS IN RELIGIOUS HISTORY. 4 HOURS. May be repeated for credit. Same as Religious Studies 395. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

396.   TOPICS IN THE HISTORY OF SCIENCE. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

397.   TOPICS IN THE HISTORY OF TECHNOLOGY. 4 HOURS. May be repeated for credit. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

Courses for Graduate Students

Note: Seminars are generally offered in two-quarter or three-quarter sequences. Students may enroll in more than one section.

400.   COLLOQUIUM FOR TEACHERS OF HISTORY. 4 HOURS. May be repeated for credit. Reading and discussion of significant primary and secondary sources; investigation and development of instructional materials and techniques. Prerequisite: Consent of the instructor.

402. SEMINAR ON ANCIENT HISTORY. 4 HOURS. May be repeated for credit for a maximum of 48 hours. Concurrent registration in more than one section is permitted for a maximum of 16 hours per quarter.

408. SEMINAR ON MEDIEVAL HISTORY. 4 HOURS.

410. SEMINAR ON RENAISSANCE HISTORY. 4 HOURS.

411. COLLOQUIUM ON EUROPEAN HISTORY. 4 HOURS. Reading in topics in European history. Prerequisite: Consent of the instructor.

412. SEMINAR ON EUROPEAN HISTORY. 4 HOURS.

421. COLLOQUIUM ON BRITISH HISTORY. 4 HOURS. Reading in topics in British history. Prerequisite: Consent of the instructor.

422. SEMINAR ON BRITISH HISTORY. 4 HOURS. May be repeated for credit for a maximum of 48 hours. Concurrent registration in more than one section is permitted for a maximum of 16 hours per quarter.

431. COLLOQUIUM ON RUSSIAN HISTORY. 4 HOURS. Reading in topics in Russian history. Prerequisite: Consent of the instructor.

432. SEMINAR ON RUSSIAN HISTORY. 4 HOURS.

441. COLLOQUIUM ON AFRICAN HISTORY. 4 HOURS. May be repeated for credit. Introduction to the literature of African history. Prerequisite: 8 hours of African history.

442. SEMINAR ON AFRICAN HISTORY. 4 HOURS. May be repeated for credit.

451. COLLOQUIUM ON AMERICAN HISTORY. 4 HOURS. Reading in topics in American history. Prerequisite: Consent of the instructor.

452. SEMINAR ON AMERICAN HISTORY. 4 HOURS. May be repeated for credit for a maximum of 48 hours. Concurrent registration in more than one section is permitted for a maximum of 16 hours per quarter.

462. SEMINAR ON LATIN AMERICAN HISTORY. 4 HOURS.

471. COLLOQUIUM ON FAR EASTERN HISTORY. 4 HOURS. Reading in topics in Far Eastern history. Prerequisite: Consent of the instructor.

479. SEMINAR: THEORETICAL, HISTORICAL, AND PHILOSOPHICAL ISSUES IN PSYCHOLOGY. 2 HOURS. May be repeated. Same as Philosophy 479 and Psychology 479. Systematic review of special topics; emphasis on current approaches and interpretations. Prerequisite: Consent of the instructor.

481. COLLOQUIUM ON SOCIAL HISTORY. 4 HOURS. Reading in topics in social history. Prerequisite: Consent of the instructor.

482. COLLOQUIUM ON MIGRATION HISTORY. 4 HOURS. Reading in topics in migration history. Prerequisite: Consent of the instructor.

489. SEMINAR ON URBAN HISTORY. 4 HOURS.

491. COLLOQUIUM ON CONSTITUTIONAL HISTORY. 4 HOURS. Reading in topics in constitutional history. Prerequisite: Consent of the instructor.

492. HISTORIOGRAPHY. 4 HOURS. Great historians from early times to the present.

493. HISTORICAL METHODS. 4 HOURS. A laboratory course that provides an understanding of the study of history and practical application of the methods by which the past is reconstructed.

497. RESEARCH AND WRITING. 0 TO 12 HOURS. Special problems in research and individual guidance in the preparation of master's research essays.

498. INDEPENDENT STUDY. 0 TO 12 HOURS.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit.

INFORMATION ENGINEERING

Professors: Bruce H. McCormick, Head of the Department; Robert C. Arzbaecher, Earl E. Gose, Philip Parzen, Chathilingath K. Sanathanan, Bert L. Zuber

Associate Professors: Roger C. Conant, Sharad R. Laxpati, Chu-Quon Lee, Glenn K. Manacher, Tadao Murata, Piergiorgio L.E. Uslenghi

Assistant Professors: Yun-Leei Chiou, Robert A. Dell, John D. Ferguson, Hitoshi Inada, Philip L. Katz, Bernard J. Nordmann, Jr. (Adjunct), Roland Priemer, John L. Semmlow, Steven A. Vere, Harry L. Wheaton (Adjunct)

The department offers a program leading to the Master of Science in Information Engineering and, jointly with the Departments of Energy Engineering and Materials Engineering, a program leading to the Doctor of Philosophy in Engineering. The Department of Information Engineering, in cooperation with the Department of Electrical Engineering at Urbana-Champaign, also offers an intercampus program leading to the Doctor of Philosophy.

The program leading to the MS is offered for graduates of information engineering-oriented curricula at the University of Illinois at Chicago Circle and for graduates of computer science, communication engineering, electrical engineering, and other similar curricula elsewhere. Graduates of other scientifically oriented curricula may be admitted if they have the background to profit from graduate work in this field. The program is designed to provide students with a broad background in computer, electrical, and information engineering. Through formal course work and thesis research, students have the opportunity to specialize in such areas as computer architecture, information networks, software design, artificial intelligence, control systems, dynamic modeling and simulation, ecological systems, digital communications, modern electromagnetics and optics, networks, and solid state electronics.

The doctoral program invites applications from superior students holding the Master of Science in Information Engineering from the University of

Illinois at Chicago Circle or an equivalent degree from other accredited institutions. Students are encouraged to follow interdisciplinary programs that include more than one area of specialization and that may require taking courses in more than one department. The program includes several areas of specialization. Among these, the Department of Information Engineering offers study and research in computer science and engineering, electrical science and engineering, information systems, health-care delivery systems, and industrial automation. These broad research areas also apply to the cooperative degree program with the Urbana-Champaign campus.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study. In exceptional cases, students who have averages of less than 4.00 but above 3.50 or practicing engineers who wish to return to school for further graduate study may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Depending on their qualifications and background, such students may be admitted on limited status and will be required to remedy department deficiencies before being admitted to regular status.

Degree Requirements

A grade point average of at least 4.00 is required. Credit toward a graduate degree is not given for any course in which a grade of less than C has been earned.

Master of Science

The minimum requirements are:

1. A minimum of 48 quarter hours of course work with a minimum of 24 quarter hours in information engineering courses.

2. At least three information engineering courses (12 quarter hours) at the 400 level, chosen among at least two areas of specialization. (For a list of these areas and associated courses, consult the director of graduate studies.)

3. Two information engineering courses (8 quarter hours) at the 400 level, including seminar, individual research, and thesis.

4. Either the completion of a satisfactory research, design, or reading project (a written report and oral examination are required) or a thesis. The student receives credit for at least 4 but not more than 16 quarter hours.

Doctor of Philosophy

Individuals with superior training, upon application, are invited to take a qualifying examination. Upon successful completion of the qualifying examination and completion of the MS, the student may be admitted as a candidate for the degree of Doctor of Philosophy in Engineering.

A minimum of 96 quarter hours of course work beyond the baccalaureate is required. Toward the end of the course work and after having clearly identified a thesis topic, the candidate must pass an oral preliminary examination administered by a faculty committee.

The candidate must earn an additional 48 quarter hours in Information Engineering 499—Thesis Research during his dissertation work.

A major requirement of the doctoral program is the completion of a thesis based on original research carried out under the supervision of a faculty committee consisting of at least five members, of whom at least three shall be from within and one from without the Department of Information Engineering. The candidate must defend his dissertation before his thesis committee in a public examination.

Proficiency in a foreign language is not required.

Courses for Graduate and Advanced Undergraduate Students

307.   CYBERNETICS I. 4 HOURS. Same as Systems Engineering 307. Introduction to artificial intelligence and pattern recognition by computer. Programs for playing games, proving theorems, answering questions, and making medical diagnoses. Property selection and decision-making techniques. Prerequisites: Math 195 and either 250 or 370.

311.   LINEAR SYSTEMS ANALYSIS. 4 HOURS. No graduate credit for majors in information engineering. Application of signal representations discussed in Information Engineering 212 to the analysis of linear systems; transform methods and frequency analysis; natural response, stability; signal flow graphs; Laplace transform with two variables; convolution integral and applications. Prerequisite: InfE 212.

312.   INTRODUCTION TO COMMUNICATION ENGINEERING. 4 HOURS. Introduction to communication systems; amplitude, frequency, and pulse-type modulation, time and frequency multiplexing, noise calculations and signal to noise ratio. Prerequisites: InfE 212, 240, and concurrent registration in InfE 340.

315.   INTERMEDIATE NETWORK ANALYSIS. 4 HOURS. Network theorems; introduction to topological approaches in general linear network analysis; loop, node, and state variable equations; network functions; the positive and real concept. Prerequisite: InfE 311.

316.   INTRODUCTION TO NETWORK SYNTHESIS. 4 HOURS. Continues Information Engineering 315. Positive real functions, LC synthesis, RC, RL, and RLC synthesis, and filter design. Individual projects are required. Prerequisite: InfE 315.

320.   FIELDS AND WAVES III. 4 HOURS. Transmission line equations. Transient phenomena; time-harmonic waves. Nonelectromagnetic waves. Scattering matrix and applications. Prerequisite: InfE 211.

324.   PRINCIPLES OF MICROWAVES. 4 HOURS. Analysis of guided waves. Rectangular and circular cylindrical waveguides. Coaxial lines. Dielectric rod microwave devices. Microwave network theory. Prerequisite: InfE 320.

325. ANTENNA ENGINEERING AND WAVE PROPAGATION. 4 HOURS. Radiation from current elements. Scalar and vector formulation for radiation and scattering. Theorems of antenna analysis. Antenna impedance. Arrays. Prerequisite: InfE 320.

326. MICROWAVE SEMICONDUCTOR ELECTRONICS. 4 HOURS. Varactor diodes, parametric devices, and harmonic generators. Tunnel, IMPATT, and Gunn diodes, with applications. Prerequisites: InfE 320, 346.

327. MODERN LINEAR OPTICS. 4 HOURS. Two-dimensional Fourier analysis, linear invariant systems, sampling theory. Applications of transfer functions to scalar diffraction, gratings, and lenses. Frequency analysis of imaging systems. Spatial filtering and optical information processing. Holography and its applications. Prerequisites: InfE 212, 221.

330. COMMUNICATION THEORY I. 4 HOURS. With Information Engineering 331, an introduction to statistical communication theory. Signal spectra, modulation, noise, probability theory; applications of statistics to communication systems. Prerequisite: InfE 312.

331. COMMUNICATION THEORY II. 4 HOURS. Continues Information Engineering 330. Individual projects are required. Prerequisite: InfE 330.

340. ELECTRONIC CIRCUITS. 4 HOURS. Analysis and design of analog and digital electronic circuits; basic circuit properties, linear amplifiers, stability, operational and multistage configurations, tuned amplifiers and oscillators. Practical laboratory experience. Prerequisites: InfE 212, 240, Math 195.

344. ELECTRONIC SWITCHING, TIMING, AND PULSE CIRCUITS. 4 HOURS. Analysis of piecewise linear active networks; single time constant circuit evaluation; semiconductor devices as switching elements; clamping, coupling, regenerative switching, and linear sweep circuits; pulse transformers; negative-resistance devices. Prerequisites: InfE 212, 340.

345. INTEGRATED CIRCUIT APPLICATIONS AND SYSTEMS. 4 HOURS. Components in integrated circuits; digital integrated circuit families; linear wideband, differential, operational, and power amplifiers; operational amplifier design, analysis, and switching circuit applications; communication and data conversion circuits; digital information storage. Prerequisite: InfE 344.

346. SEMICONDUCTOR ELECTRONICS. 4 HOURS. Electron and hole transport mechanisms in semiconductor devices; quantum approach to distributions and statistics, recombination and generation, p-n junctions, and transistors; practical laboratory experience. Prerequisites: InfE 240 and credit or registration in Phys 232.

347. THIN FILM DEVICES. 4 HOURS. Introduction to vacuum technology. Methods of fabrication of films, sputtering, evaporation, electron beam evaporation, and chemical deposition. Physical properties of films. Application of such films as resistor, capacitor, transistor, diode, magnetic memory devices, and superconductors. Prerequisites: InfE 340, 346.

348. FIELD EFFECT DEVICES. 4 HOURS. Electronic processes in surface-controlled semiconductor and dielectric devices. Properties of MIS field effect capacitors and transistors, surface and interface effects, and fabrication techniques. Prerequisites: MatE 230, InfE 340 and 346.

350. **PROSTHESES AND ARTIFICIAL ORGANS. 4 HOURS.** The special problems encountered in the design of organ replacements as engineering devices. Sub-organ replacements, circulatory assist devices, artificial kidneys, and other organ systems. Prerequisites: InfE 200, 383, 384, MatE 230, and EnrE 211 or the equivalents.

352. **BIOCONTROL. 3 HOURS.** Same as Bioengineering 352. Applicability of control systems theory to physiological systems, including the pupil system and eye and hand movement systems, by utilizing such techniques as Fourier analysis, Nyquist stability criteria, and cross-correlation. Prerequisites: InfE 311 and 383 or 384.

353. **BIOCONTROL LABORATORY. 3 HOURS.** Same as Bioengineering 353. Experimental counterpart of Information Engineering 352. Motor coordination, crayfish photoreceptor, human pupil, eye movement. Prerequisite: Credit or registration in InfE 352.

354. **BIOINSTRUMENTATION: TRANSDUCERS. 4 HOURS.** Energy conversion; detailed discussion of transducers used in biological research. Prerequisites: InfE 240, 311.

355. **ENGINEERING BIOPHYSICS. 4 HOURS.** Introduction to biophysical mechanisms at the molecular, celluar, and organ levels. Passive and active properties of excitable tissue; quantitative descriptions and modeling of biophysical mechanisms; cell-to-cell transmission and ionic mechanisms. Prerequisites: Math 220, Phys 231, and any two of InfE 100, 101, 102.

359. **NEUROANATOMY. 5 HOURS.** Same as Bioengineering 359 and Biological Sciences 359. Introduction to the neurological organization of the mammalian central nervous system. Prerequisites: BioS 280 and consent of the instructor.

360. **AUTOMATIC CONTROL THEORY I. 4 HOURS.** Introductory mathematical preliminaries of control systems. Concept of feedback; transfer functions of typical electrical, mechanical, and hydraulic control systems; state variable representation of systems; signal flow graphs; implications of feedback on system performance; time domain analysis; stability concepts, including Lyapunov, Routh-Hurwitz, and Nyquist stability criteria. Laboratory assignments include experimental determination of the response of typical control systems and analog computer simulations. Prerequisite: InfE 311 or SvsE 315.

361. **AUTOMATIC CONTROL THEORY II. 4 HOURS.** Continues Information Engineering 360. Introduction to the design of feedback control systems. Frequency response methods, root locus, Nichols chart, compensation techniques. Introduction to modern control theory, matrix representation of linear systems and mode interpretations, concepts of controllability and observability, and linear time-varying systems. Projects involving intensive studies on servo systems and extensive simulations on digital or analog computers. Prerequisite: InfE 360.

371. **SWITCHING NETWORKS AND LOGICAL DESIGN. 4 HOURS.** Basic concepts common to digital systems. Coding and representation of information, non-decimal number systems, switching algebra, combinational logic, electronic implementation and representation of logic, minimization techniques, analysis and synthesis of asynchronous and synchronous sequential networks, error correcting codes, hazards and races due to logical circuit delays. Prerequisite: InfE 271.

373. COMPUTER ORGANIZATION AND ARCHITECTURE. 3 HOURS. Evolution of design concepts into system organization and hardware-software integration. Memory and input-output units, channel controllers, interrupt concepts, cycle stealing, examples of general purpose computer organization. Hardware-software tradeoffs. Introduction to machine languages, assemblers, and loaders. Prerequisite: InfE 271.

379. REAL-TIME DATA PROCESSING. 4 HOURS. Theory and techniques of data processing using analog and digital computers. Emphasis on the unique computational problems presented by biological data, illustrating the practical use of communication theory. Prerequisites: Math 195, 220.

391. SEMINAR. 1 TO 4 HOURS. May be repeated for credit. Topics of mutual interest to a faculty member and a group of students. Offered as announced by department bulletin or the Timetable. Prerequisite: Consent of the instructor.

393. SPECIAL PROBLEMS. 2 TO 4 HOURS. May be repeated for credit. Special problems or reading by arrangement with the faculty. Prerequisite: Consent of the instructor.

396. SENIOR DESIGN I. 4 HOURS. Same as Bioengineering 396, Energy Engineering 396, Materials Engineering 396, and Systems Engineering 396. Introduction to engineering economics, legal and social constraints on design, safety and reliability theory, and the use of simulation and optimization techniques in the engineering design process. Prerequisites: Senior standing and completion of all core requirements in the College of Engineering.

397. SENIOR DESIGN II. 4 HOURS. Same as Bioengineering 397, Energy Engineering 397, Materials Engineering 397, and Systems Engineering 397. Application of principles of engineering and engineering design methodology to the solution of a large-scale design problem. May be taken in any department, regardless of area of concentration. Prerequisite: InfE 396.

Courses for Graduate Students

408. CYBERNETICS II. 4 HOURS. Comparison of natural and artificial intelligence and pattern recognition. Information processing in nets. Image processing. Models of retinal and brain structure, thought, learning, and memory. Prerequisite: InfE 307.

409. PATTERN RECOGNITION TECHNIQUES AND SYSTEMS. 4 HOURS. Functions and systems of functions, such as machines designed to learn the common properties of a set of N-dimensional vectors of patterns representing samples of a class and to recognize a new vector as a possible member of the class by noting properties common to the set of sample vectors. Prerequisites: SysE 372 and 451 or InfE 307.

410. ADVANCED LINEAR ANALYSIS. 4 HOURS. Analysis of linear networks and systems in the time and frequency domains. Basis of loop and node equations. Signal flow graphs, transform methods, state variable representation, stability. Prerequisites: InfE 311 and credit or registration in Math 330.

412. PASSIVE NETWORK SYNTHESIS. 4 HOURS. Review of driving point synthesis. Various techniques of transfer function synthesis. The approximation problem for frequency and time domain synthesis. Modern filter design. Prerequisites: InfE 316 or consent of the instructor and credit or registration in Math 330.

413.   ACTIVE NETWORK SYNTHESIS. 4 HOURS. Linear active and nonreciprocal network synthesis. Realizations involving negative resistances, controlled sources, negative immittance convertors, gyrators, and operational amplifiers. Sensitivity considerations. Application to active integrated circuit synthesis. Prerequisite: InfE 316.

414.   ADVANCED TOPICS IN NETWORK THEORY. 4 HOURS. Selection from such topics as linear multiport network synthesis, scattering matrix synthesis, analysis and design of distributed parameter networks, nonlinear and time-varying circuit theory, and digital filters. Prerequisite: InfE 410 or 412.

415.   NETWORK TOPOLOGY. 4 HOURS. Network theoretic graph theory. Tree, cutset, path, circuit, and incidence matrices and their properties. Topological formulas for passive and active network analysis. Topological analysis and synthesis of switching circuits. Applications to transportation and communication networks. Flow-graph techniques of linear system analysis. Prerequisite: InfE 315.

420.   ELECTROMAGNETIC FIELD THEORY. 4 HOURS. Maxwell's equations and special relativity. Charged particles dynamics. General theories for interior and exterior boundary-value problems. Propagation in various media. Prerequisites: InfE 324 or 325; credit or registration in Math 330.

421.   COMPUTATIONAL ELECTROMAGNETICS. 4 HOURS. Finite-element solution of Poisson's and Helmholtz's equations. Computer solutions of integral equations of antennas and scattering theory: method of moments, fast Fourier transform method. Time-domain analysis: Singularity expansion method, short pulse response. Emphasis on practical problems in radiation and scattering. Prerequisite: InfE 420 or the equivalent.

422.   ADVANCED MICROWAVE THEORY. 4 HOURS. Microwave integrated circuits. Microwave devices, cavities, and filters. Solid state traveling-wave amplifiers and oscillators. Prerequisites: InfE 324 and 326 or the equivalents.

423.   ANTENNA THEORY AND DESIGN. 4 HOURS. Antenna parameters. Analysis of linear and loop antennas. Uniform and nonuniform arrays. Slot, horn, conical, and spheroidal radiators. Reflector, traveling wave, broadband, and lens antennas. Antenna pattern synthesis. Prerequisites: InfE 325, 420.

427.   OPTICAL ELECTRONICS. 4 HOURS. Waves, rays, and gaussian beams in various media. Optical resonators. Interaction of radiation and atomic systems. Theory of laser oscillation. Solid, gas, and semiconductor lasers. Nonlinear optical phenomena. Optical radiation: modulation, detection, and noise. Optical communication systems. Prerequisites: InfE 327 and 420 or the equivalents.

428.   INTEGRATED OPTICS. 4 HOURS. Fabrication techniques and optical properties of thin solid films. Thin-film optical waveguides; methods of mode launching; radiation losses due to bend and surface irregularities. Integrated optics lasers. Modulators and deflectors. Parametric thin-film optical devices. Prerequisite: InfE 420 or the equivalent.

430.   ADVANCED COMMUNICATION THEORY I. 4 HOURS. Beginning graduate course in modern communication theory. Review of probability theory, random waveforms, optimum receiver principle. Prerequisite: InfE 331.

431.   ADVANCED COMMUNICATION THEORY II. 4 HOURS. Continues Information Engineering 430. Efficient signaling for message sequences and implementation of coded systems. Prerequisite: InfE 430.

432.   ADVANCED COMMUNICATION THEORY III. 4 HOURS. Continues Information Engineering 431. Channel models, filter-signal channel, bandpass channel, fading channel. Linear modulation, twisted modulation, frequency modulation, channel capacity, pulse-code modulation. Prerequisite: InfE 431.

439.   SEMINAR ON BEHAVIOR AND INFORMATION THEORY. 3 HOURS. Topics in the application of information theory to behavior; emphasis on infra-human behavior. Prerequisite: Math 370 or InfE 408 or Psch 470.

440.   SOLID STATE DEVICE THEORY I. 4 HOURS. Electrical phenomena in solids, using quantum mechanics. Semiconductors, p-n junctions, transistors. Hall effect, thermal and optical effects. Prerequisites: InfE 342, Phys 321.

441.   INTEGRATED SOLID STATE DEVICES. 4 HOURS. Applications of solid state theory to modern integrated circuits. Active and passive semiconductors, active and passive functional blocks, MOS and thin film devices. Prerequisites: InfE 316, 440.

442.   SOLID STATE DEVICE THEORY II. 4 HOURS. Tunnel, Gunn, and IMPATT diodes, insulator diodes, carrier traveling wave effects in semiconductors. Prerequisites: InfE 440 and credit or registration in InfE 420.

451.   ADVANCED BIOCONTROL. 4 HOURS. Same as Bioengineering 451. Mathematical modeling and analysis of biological systems, emphasizing techniques of control engineering. Laboratory experiments on control systems of pupil eye movement and sensory motor coordination. Prerequisite: InfE 353.

452.   ADVANCED BIOCONTROL LABORATORY. 3 HOURS. Laboratory experiments in conjunction with Information Engineering 451. Experience with control systems of pupil, eye movement, sensory motor coordination. Prerequisite: Credit or registration in InfE 451.

453.   ADVANCED SYSTEMS PHYSIOLOGY. 3 HOURS. Intensive treatment of selected neurophysiological topics; emphasis on systems organization. Prerequisite: InfE 353.

454.   ADVANCED SYSTEMS PHYSIOLOGY LABORATORY. 2 HOURS. Coding in the frog's retina using microelectrode techniques. Prerequisite: InfE 453.

457.   ANALYSIS OF VISUAL SYSTEMS. 4 HOURS. An advanced course covering in detail important research areas of the visual system. The fundamental importance of physical, chemical, and physiological processes as related to vision is stressed. Prerequisite: Consent of the instructor.

460.   ADVANCED CONTROL THEORY. 4 HOURS. Analysis of multivariable, multiloop control systems. Advanced topics in state space, time varying and distributed parameter systems, stability, controllability, and observability. Introduction to adaptive control. Various computer applications. Prerequisite: InfE 361.

461. NONLINEAR CONTROL. 4 HOURS. Classification of nonlinear phenomena, linear and piecewise linear approximations. The describing function and on-off servomechanisms, phase plane techniques, limit cycle, stability concepts. Use of analog, digital, and hybrid computers for simulation. Prerequisite: InfE 361.

462. SYNTHESIS TECHNIQUES IN LINEAR CONTROL. 4 HOURS. Design principles. Cascade compensation using root locus, polar and log plots, feedback compensation. Applications in electrical, electromechanical, and fluid control. Mitrovic's parameter plane methods. Prerequisite: InfE 361.

463. STATISTICAL AND SAMPLED DATA CONTROL. 4 HOURS. Basic principles of statistical design; random signals in a control system; properties of correlation function; optimality. Wiener-Hopf equation. Design of systems with constraints. Introduction to sampled data control; the sampling process; Z transform methods; stability, time and frequency response, compensation techniques. Prerequisites: InfE 330, 361.

470. AUTOMATA THEORY. 4 HOURS. Definition and representation, equivalent states, congruence relations, decision problems of finite automata, the halting problem, state assignment problem, partitions, growing automata, probabilistic automata, self-repairing and self-reproducing systems. Prerequisite: InfE 373.

471. ADVANCED SWITCHING THEORY. 4 HOURS. Principles of sequential circuit synthesis, structure of combinational switching circuits, the covering problem, multiple output and multilevel combinational circuits, bilateral switching networks, speed independent switching circuit theory. Prerequisite: InfE 373.

472. HYBRID COMPUTATION THEORY AND TECHNIQUES. 4 HOURS. Basic characteristics of analog and digital computers, nature of problems best suited for these computers, organization of a hybrid computer, analog digital conversion, hybrid computing techniques with examples from different disciplines. Prerequisite: InfE 373.

484. BIOINSTRUMENTATION: SYSTEMS. 3 HOURS. Analysis of systems used in biological and medical instrumentation. General principles and specific electrical, mechanical, and optical aspects of instrumentation systems.

491. SEMINAR. 1 TO 4 HOURS. Topics to be arranged. Prerequisite: Consent of the instructor.

495. INDIVIDUAL RESEARCH. 2 TO 4 HOURS. May be repeated. Research on special problems not included in graduate thesis. Prerequisite: Consent of the instructor.

499. GRADUATE RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Thesis work under the supervision of a graduate adviser.

LINGUISTICS

Professors: Andrew Schiller, Head of the Department; Michael A.K. Halliday, Falk S. Johnson

Associate Professors: Adam Makkai, Valerie B. Makkai

Assistant Professors: Edward J. Stone, Dale E. Woolley

The Department of Linguistics offers work leading to the Master of Arts in two fields of concentration: theoretical linguistics, which prepares students for admission to programs offering advanced professional training at the doctoral level, and applied linguistics, including a Teachers of English to Speakers of Other Languages (TESOL) specialization, which prepares students for careers as language teachers.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study. In exceptional cases, students who have averages of less than 4.00 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully.

Applicants must submit the following, unless exempted:

1. Three letters of recommendation, preferably from professors who are familiar with the applicant's recent work.
2. A statement of about 250 words presenting the applicant's reasons for wishing to do graduate work in linguistics and the relationship of his work to his professional and other goals.

A foreign applicant is also required to submit a four- to five-page summary of his educational experience, emphasizing his work in English and other literatures and languages and concluding with a statement of his reasons for wanting to do graduate work in the United States. This replaces the 250-word statement required of other applicants.

Degree Requirements

Master of Arts in Theoretical Linguistics or Applied Linguistics

Hours. A minimum of 48 quarter hours of course work is required, including Linguistics 305—Introduction to Linguistics and Linguistics 309—Introduction to Bibliography and Research. At least 24 quarter hours of course work must be in linguistics. At least 16 quarter hours must be in 400-level linguistics courses.

Language. The student must pass a reading examination in either one or two foreign languages, which may be other than classical and modern European. One foreign language is required for the degree in applied linguistics, two foreign languages for the degree in theoretical linguistics.

Thesis. The student is required to submit a thesis. He may register for up to 12 hours of thesis research.

Examination. The student must pass a comprehensive examination.

Master of Arts in Applied Linguistics with Specialization in TESOL

The requirements for the MA in applied linguistics apply, but with these differences:

1. The following three courses must be included in the 48 quarter hours required for the degree:
   Linguistics 342—Contrastive Language Studies
   English/Education 383—Teaching English as a Second Language
   Linguistics 454—Linguistics and Language Learning
2. In place of the thesis, the student must register for up to 12 hours in Linguistics 498—Internship in TESOL. The arrangements for the internship are made by the Department of Linguistics.

Independent Study. Some of the degree requirements may be met through independent study courses. They are primarily intended for advanced graduate students and serve needs that cannot be met by existing courses, colloquia, or seminars. A student should make arrangements for an independent study course well in advance of the beginning of the quarter. A written plan of work at the beginning of study and a final written report at its conclusion are required and become part of the student's permanent department records. Normally, no more than one quarter of the total hours required for the degree should be in independent study. (This does not apply to thesis research).

Courses for Graduate and Advanced Undergraduate Students

305. INTRODUCTION TO LINGUISTICS. 4 HOURS. Introduction to the theories and methods of the phonological, morphological, and syntactic analysis of language. Prerequisite: Junior standing.

307. HISTORY OF LINGUISTIC SCIENCE. 4 HOURS. Development of linguistic thought from its historical beginnings to the present. Prerequisite: Ling 305 or junior standing and consent of the instructor.

309. INTRODUCTION TO BIBLIOGRAPHY AND RESEARCH. 4 HOURS. Required for graduate students in linguistics. Detailed study of bibliographical tools in the various fields of linguistics. Prerequisite: Junior standing.

310. PHONOLOGY. 4 HOURS. Introduction to the theories and methods of phonological analysis. Prerequisite: Ling 305 or junior standing and consent of the instructor.

320. MORPHOLOGY. 4 HOURS. Introduction to the theories and methods of morphological analysis. Prerequisite: Ling 310 or junior standing and consent of the instructor.

330. SYNTAX. 4 HOURS. Introduction to the theories and methods of syntactic analysis. Prerequisite: Ling 320 or junior standing and consent of the instructor.

340. COMPARATIVE AND HISTORICAL LINGUISTICS. 4 HOURS. The comparative and diachronic study of languages. Prerequisite: Ling 310 or junior standing and consent of the instructor.

352.   APPLIED LINGUISTICS. 4 HOURS. May be repeated for a maximum of 12 hours of credit. Study of a selected topic, such as the problems of literary style, rhetoric, metrics, or the construction of pedagogical grammars. Content varies. Prerequisite: Ling 305 or junior standing and consent of the instructor.

353.   DIALECTOLOGY. 4 HOURS. Geographical and social variations in languages. Prerequisite: Ling 310 or junior standing and consent of the instructor.

356.   FIELD METHODS IN LINGUISTICS. 4 HOURS. The description of a language using data supplied by native speakers. Prerequisite: Ling 310 or junior standing and consent of the instructor.

357.   SYSTEMIC AND FUNCTIONAL DESCRIPTION OF MODERN ENGLISH I. 4 HOURS. An introductory scientific description; emphasis on surface structure. Prerequisite: Ling 305.

358.   SYSTEMIC AND FUNCTIONAL DESCRIPTION OF MODERN ENGLISH II. 4 HOURS. Advanced scientific description; emphasis on meaning and social codes. Prerequisite: Ling 357.

359.   TOPICS IN LINGUISTICS. 4 HOURS. May be repeated for a maximum of 12 hours. Topics vary. Prerequisite: Consent of the instructor.

374.   THE PSYCHOLOGY OF LANGUAGE. 4 HOURS. Same as Psychology 354 and Speech and Theater 354. Introductory survey of methods, theory, and research; the history and present status of psychology's interest in language behavior. Prerequisite: Consent of the instructor.

380.   PROBLEMS IN LINGUISTIC ANALYSIS. 4 HOURS. Same as Anthropology 380. The methods and techniques used in linguistics, with reference to actual language data; emphasis on anthropological applications. Prerequisite: Anth 280 or Ling 305.

Courses for Graduate Students

445.   INTRODUCTION TO INDO-EUROPEAN STUDIES. 4 HOURS. Prerequisites: A reading knowledge of French or German and consent of the instructor.

453.   LANGUAGE TYPOLOGY. 4 HOURS. Theories and methods of the classification of languages. Prerequisite: Ling 330 or the equivalent.

454.   LINGUISTICS AND LANGUAGE LEARNING. 4 HOURS. Applications of linguistic science to the teaching of foreign languages. Prerequisite: Ling 330 or the equivalent.

457.   SEMANTICS. 4 HOURS. The study of meaning. Prerequisite: Ling 330 or the equivalent.

459.   SEMINAR ON LINGUISTICS. 4 HOURS. May be repeated for a maximum of 12 hours. Topics vary. Prerequisite: Consent of the instructor.

471.   EXPERIMENTAL PSYCHOLINGUISTICS. 4 HOURS. Same as Psychology 401 and Speech and Theater 401. Intensive review of experimental laboratory studies concerned with the effects of phonological, syntactic, and semantic variables on sentence perception, comprehension, production, and memory in the mature user of language. The relevance of the research in contemporary psycholinguistic

theory is emphasized. Prerequisites: Ling 374 or the equivalent and consent of the instructor.

472.   DEVELOPMENTAL PSYCHOLINGUISTICS. 4 HOURS. Same as Psychology 427. Theoretical formulation, research methods, and research findings in the area of language development. Biological foundations and environmental influences; disorders of language development. Prerequisite: Ling 374.

480.   SEMINAR ON SOCIOLINGUISTICS. 4 HOURS. Same as Anthropology 480. Past and current approaches to sociolinguistics; variations of linguistic structure with social structure among different linguistic groups. Prerequisite: Ling 380.

497.   INDEPENDENT STUDY IN LINGUISTICS. 2 TO 8 HOURS. May be repeated for a maximum of 8 hours. Independent study and research on a topic other than that approved for a graduate thesis. Prerequisite: Consent of the instructor and the head of the department.

499.   THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for a maximum of 16 hours. Open only to degree candidates. Independent research on a topic approved for a graduate thesis. Prerequisite: Consent of the thesis supervisor and the head of the department.

MATERIALS ENGINEERING

Professors: Ernest F. Masur, Head of the Department; Thomas H. Blewitt, Robert F. Domagala, Jorge O. Galante (Adjunct Research Professor), David W. Levinson, William Rostoker, John A. Schey, Albert B. Schultz, Surendra P. Shah, Thomas C.T. Ting, Otto E. Widera

Associate Professors: Ted B. Belytschko, Robert H. Bryant, Dusan Krajcinovic, Paul E. Mast (Adjunct), Marshall L. Silver, Chien H. Wu

Assistant Professors: Graham M. Brown, Lawrence E. Carlson, Antoine E. Naaman, Fred A. Webster, Michael J. Weins

The department offers a program leading to the Master of Science in Mechanics and Materials. Jointly with the Department of Energy Engineering it offers a program leading to the Doctor of Philosophy in Engineering.

The MS program covers a broad range of topics and may be used either as a terminal program or as a basis for further studies. The courses offered are relevant to many professional disciplines. Because of extensive freedom in course selection, a student may prepare himself for a career in such diverse areas of concentration as metallurgy, soil mechanics and foundations, structures (including concrete technology), engineering mechanics (including machine mechanics and biomechanics), and environmental mechanics and materials. Interdisciplinary and interdepartmental programs are permitted and encouraged, especially in the biological and environmental disciplines.

The student selects a department adviser with whom a tentative course program is planned. Both program and adviser may be changed at any time to suit the student's needs and preferences; however, satisfaction of the department degree requirements must be verified by the department.

To aid the student in planning his initial program, the following courses offered by the Department of Materials Engineering are listed according to this disciplinary relevance. For possible program and course combinations and for information on new course offerings the special department brochures and bulletins should be consulted.

Metallurgy—Materials Engineering 331, 332, 333, 334, 335, 337, 338, 360, 361, 362, 363, 364, 384, 432, 433, 434, 461, 462, 463, 465, 466, 467

Geotechnical Engineering and Geosciences—Materials Engineering 344, 345, 346, 370, 371, 372, 373, 434, 441, 442, 447 and courses in geological sciences

Structures—Materials Engineering 302, 321, 322, 324, 325, 326, 402, 406, 411, 421, 422, 423, 424, 425

Mechanics—Materials Engineering 302, 303, 304, 308, 309, 311, 312, 313, 316, 333, 360, 361, 383, 402, 403, 404, 406, 408, 409, 411, 412, 413, 414, 415, 416, 419, 420, 433, 461, 462, 463

Environmental Mechanics and Materials—Materials Engineering 302, 304, 308, 311, 312, 313, 321, 322, 333, 334, 338, 370, 381, 383, 411, 412, 413, 421, 425, 463

In the environmental mechanics and materials areas the student is expected to supplement his program with relevant course offerings in the Departments of Energy Engineering and Systems Engineering and in the School of Public Health of the University of Illinois at the Medical Center.

The joint PhD program includes several areas of specialization, of which the Department of Materials Engineering covers the fields of continuum mechanics, metallurgy, geotechnical engineering, and structures. Students are permitted and encouraged to follow interdisciplinary programs that include more than one area of specialization and may require taking courses in more than one department.

The Department of Materials Engineering in cooperation with the Department of Geological Sciences also offers a coordinated program of study for students interested in geotechnical engineering and geosciences. This program, leading to the Doctor of Philosophy in Engineering, will enable the student with interests in soil engineering, rock mechanics, engineering geology, hydrology, environmental geology, geophysics, and other areas of the geosciences to obtain an advanced degree.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate in engineering or a related field from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study. In exceptional cases, students with averages of less than 4.00 but above 3.50 or practicing engineers and geoscientists who wish to return to school for graduate instruction may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Depending on their qualifications and background, such students may be admitted on limited status and will be required to remedy department deficiencies before being admitted to regular status.

Degree Requirements

A grade point average of at least 4.00 is required. Credit toward a graduate degree is not given for any course in which a grade of less than C has been obtained.

Master of Science

Of the required 48 quarter hours at least 16 must be in 400-level courses. Because of the diversity of the department offerings and areas of specialization, specific courses are not prescribed; however, to insure adequate breadth, the student must complete at least two courses outside his immediate area of specialization.

A thesis is required if the student selects either metallurgy or environmental mechanics and materials as his area of specialization. A thesis is optional for other students. Thesis students must enroll in Materials Engineering 499—Thesis Research up to a maximum of 12 quarter hours. Only 8 of these hours may be used to satisfy the 400-level course requirement. The student must defend the thesis before an examining committee appinted by the Dean of the Graduate College.

Doctor of Philosophy

To become a candidate for the doctorate a student must pass a qualifying examination to be taken within one quarter of the completion of the requirements for an MS. If the student has an MS from another institution or department, he must take his qualifying examination within two quarters of his admission as a graduate student. It may be retaken once if so recommended by the examination committee.

Approximately 48 quarter hours of course work beyond the MS (or the equivalent) are required. Toward the end of his course work, the student is required to pass a preliminary examination administered by a faculty committee.

A major requirement of the PhD program is the completion of a thesis based on original research, which is carried out under the supervision of a faculty committee. The thesis must be defended before the committee and the public in an examination, notice of which appears in an official campus publication.

Foreign language proficiency is not required.

Courses for Graduate and Advanced Undergraduate Students

302.   APPLIED ELASTICITY I. 4 HOURS. Variational theorems of elasticity theory. Application to establishment and solution of approximate systems; beams (including shear deformations) and plates. Introduction to instability theory. Prerequisite: MatE 205 or 206.

303.   THEORY OF ELASTICITY I. 4 HOURS. The boundary value problems of linear isotropic elasticity theory. Uniqueness of solution. Reduction to two dimensions: the plane problem, torsion, bending. General orthogonal coordinates and special

application to polar coordinates. Three-dimensional problems with axial symmetry. Prerequisite: MatE 316.

304. EXPERIMENTAL STRESS ANALYSIS. 4 HOURS. Structural similitude and dimensional analysis. Brittle coating. Introduction to photoelasticity. Strain measurement techniques. Prerequisite: MatE 206.

308. INTERMEDIATE VIBRATION THEORY. 4 HOURS. Analytical and numerical treatment of vibrations induced in n-degree of freedom linear, discrete systems by periodic, shock, and random excitation. Prerequisite: MatE 208

309. ANALYSIS AND SYNTHESIS OF MECHANISMS II. 4 HOURS. Advanced techniques for the analysis and synthesis of motion. Emphasis on planar mechanisms. Roberts-Chebyschev theorem, Euler-Savary equation. Type, number, and dimensional synthesis. Geometric and algebraic techniques. Applications, computational methods. Prerequisite: MatE 209.

311. INTERMEDIATE DYNAMICS. 4 HOURS. Kinematics of a point; space curves. Particle dynamics, orbital motion, moving reference frames. Rigid body dynamics. The inertia tensor, Euler's equations. Hamilton's principle. Generalized coordinates, LaGrange's equations. Prerequisites: MatE 211, Math 220.

312. NONLINEAR OSCILLATIONS. 4 HOURS. Exact and approximate methods of studying vibrations of nonlinear systems. Analytical and graphical techniques. Forced oscillations, self-excited systems, stability criteria. Computer methods. Practical applications. Prerequisite: MatE 208.

313. APPLIED DYNAMICS. 4 HOURS. Analytical methods in the study of dynamic forces in machines. Application of the methods to linkages, cam-systems, balancing, and critical speeds. Prerequisites: MatE 209, 311.

316. INTRODUCTION TO CONTINUUM MECHANICS. 4 HOURS. Same as Energy Engineering 316. Cartesian tensors, kinematics of fluids and solids, conservation equations, constitutive equations for simple materials. Examples. Prerequisites: EnrE 211 or MatE 204, Math 220.

321. STRUCTURAL ANALYSIS II. 4 HOURS. Establishment of basic equations governing linear structural systems. Matrix inversion and relaxation solutions. Approximate analyses. Introduction to dynamics of structure. Prerequisite: MatE 207.

322. CONCRETE TECHNOLOGY. 4 HOURS. Relations between microstructure and macroproperties, mechanism of fracture, shrinkage and creep, new types of concrete, effects of environment and mixtures. Individual research project involving laboratory and analytic techniques. 3 hours, lecture; 2 hours, laboratory. Prerequisite: MatE 203 or the equivalent.

324. LIMIT ANALYSIS AND DESIGN OF STRUCTURES. 4 HOURS. Boundedness principles of perfect plasticity. Application to analysis and design of structures. Prerequisite: MatE 207.

325. CONCRETE DESIGN OF SHELL AND PLATE STRUCTURES. 4 HOURS. Derivation of membrane and bending theories for shells of revolution, folded plates, and shells of single and double curvature. Application to barrel roofs, domes, and storage tanks. Prerequisites: Math 202 and MatE 225 or 302.

326. DESIGN IN PRESTRESSED AND PRECAST CONCRETE. 4 HOURS. Behavior and design of prestressed and precast concrete structures. Prestressing systems; problems of shrinkage, creep, and anchorage. Design of beams, slabs, containment vessels, and piles. Design of precast concrete building systems. Prerequisite: MatE 225.

327. RELIABILITY AND PROBABILITY IN STRUCTURAL DESIGN. 4 HOURS. Design of reinforced concrete and steel structures using reliability, probability, and statistical concepts. Common models of structural behavior. Predicting strength and load variabilities. Designing for specific levels of reliability. Prerequisites: MatE 207 and either 221 or 225.

331. ELECTRON THEORY OF METALS. 3 HOURS. Modern physical concepts of metals and alloys. Introduction to wave mechanics. Thermal, electrical, and magnetic properties of metals. Band theory of metals. Prerequisite: MatE 252.

332. ADVANCED DIFFRACTION ANALYSIS. 3 HOURS. Single crystal methods in X-ray diffraction, orientation determination, pole figures, structure determination, precision lattice constant methods. Prerequisite: MatE 239 or the equivalent.

333. DESIGN USE OF MATERIALS. 4 HOURS. Extreme value statistics, mechanical effects of a notch. Fracture mechanics. Fatigue. Stress rupture. Residual stress effects. Relationships to designed performance. Prerequisite: MatE 230.

334. METALLURGY OF NUCLEAR MATERIALS. 3 HOURS. Basic principles of nuclear reactors, fission, moderation, poisoning, radioactivity. Selection of materials for fuels, cladding, moderators, coolants, and shields with regard to a reactor environment. Radiation effects, heat transfer, environmental problems, reactor safety, and neutron conservation. Prerequisites: Phys 232 or the equivalent, MatE 252

335. ELECTRON MICROSCOPY. 3 HOURS. The electron microscope and its application to the study of surface replicas and thin films of metals, alloys, and other materials. Sources of contrast. Selected area diffraction. Prerequisites: MatE 239, 252.

337. PROCESS METALLURGY OF IRON AND STEELMAKING. 4 HOURS. Physicochemical principles applied to reduction, conversion, and refining of steel and ferrous alloys. Applications of thermodynamics to equilibrium problems, such as slag-metal equilibria, and applications of process engineering principles to the dynamic behavior of various component systems, such as sinter plants, blast furnaces, and basic oxygen furnaces. Prerequisite: MatE 243.

338. PARTICULATE SOLIDS PROCESSING. 4 HOURS. Characterization of particulate solids by size and shape. Size classification and reduction. Wet and dry fluid-solid and solid-solid separation processes. Transportation and agglomeration of particulate solids. Lecture and laboratory. Prerequisites: EnrE 211, MatE 200, 230.

339. ELECTRONIC MATERIALS PROCESSING. 4 HOURS. Methods germane to materials for electronics applications, including magnetic, dielectric, and strain-sensitive materials; semiconductor materials. Prerequisite: MatE 230.

344. PHYSICAL-CHEMICAL PRINCIPLES OF SOIL BEHAVIOR I. 4 HOURS. Clay mineralogy, soil formation and composition, sedimentation, mineral identification, colloidal phenomena in soils. Prerequisite: MatE 260.

345. PHYSICAL-CHEMICAL PRINCIPLES OF SOIL BEHAVIOR II. 4 HOURS. Swelling, ion association, soil-water analysis of mechanical behavior of soils in terms of physiochemical principles, and conduction phenomena. Prerequisite: MatE 344.

346. PHYSICAL-CHEMICAL PRINCIPLES OF SOIL BEHAVIOR III. 4 HOURS. Deformation mechanisms and strength, compaction, frost action, rate processes, such as secondary compression, creep, thixotropy. Prerequisite: MatE 345.

360. DEFORMATION PROCESSING. 4 HOURS. Principles of deformation processes. Basic methods of problem-solving. Practices and process control. Relations between processing and finished properties. Prerequisites: MatE 201, 230.

361. DEFORMATION PROCESSING LABORATORY. 2 HOURS. Measurement and analysis of forces in forging, rolling, drawing, and deep drawing. Effects of material properties, process variables and friction conditions. Prerequisites: MatE 202, 360.

362. POWER METALLURGY. 4 HOURS. Physical attributes of fine powders. Mechanics of pressing. Theories of solid state sintering. Liquid phase sintering. Manufacturing aspects. Prerequisite: MatE 230.

363. ADVANCED PHASE DIAGRAMS. 4 HOURS. Ternary phase equilibria in metal systems. Vertical and horizontal sections, methods of construction and interpretation. Examination of quaternary and more complex systems. Application of thermodynamic principles to construction. Prerequisite: MatE 250.

364. POLYMER PROPERTIES AND TECHNOLOGY. 4 HOURS. Polymer structure and properties. Characterization of polymeric materials. Polymer processing and manufacturing technology. Prerequisite: MatE 230.

367. CERAMICS TECHNOLOGY. 4 HOURS. An introductory course in ceramics for engineers. Ceramics as materials of technological importance are examined from the science, engineering, and manufacturing viewpoints. Crystalline and noncrystalline (glass) materials. Special emphasis on applications in industry. Prerequisite: MatE 230.

368. SOLIDIFICATION THEORY AND PRACTICE. 3 HOURS. Theory of solidification and its applications to problems in castings and refining of crystalline materials. Prerequisites: MatE 244, 248.

370. SOIL MECHANICS I. 4 HOURS. The nature of soils and soil deposits; stresses in soil masses; granular materials; stress-strain behavior and shear strength, earth pressures on retaining structures, bearing capacity and settlements of shallow foundations. Two laboratory exercises in stresses and settlements of shallow foundations. Prerequisite: MatE 260.

371. SOIL MECHANICS II. 4 HOURS. Concepts of effective stress; seepage and pore pressures; stress-strain behavior and shear strength of drained cohesive materials; earth-retaining structures; slope stability. One laboratory exercise in the principle of effective stress. Prerequisite: MatE 370.

372. SOIL MECHANICS III. 4 HOURS. Consolidation theory; stress-strain behavior and shear strength of undrained cohesive materials; soil-structure interaction; formulation and computer solution of field problems. Prerequisites: MatE 371, Math 195 or programming experience.

373. LABORATORY DETERMINATION OF SHEAR STRENGTH OF SOILS. 2 HOURS. Approximately 4 hours per week of laboratory-lecture. Prerequisite: Credit or concurrent registration in MatE 372.

381. NOISE AND VIBRATION CONTROL. 4 HOURS. Nature of sound as it relates to the control of vibration and wave propagation. Design procedure based on hearing, acoustical environment, acoustical materials, and soil dynamics. Legal and medical problems. Prerequisite: MatE 208 or the equivalent.

383. DESIGN OF FILM BEARINGS. 4 HOURS. Application of mechanics to the design of film bearings. Journal bearings. Thrust bearings. Slider bearings. Cavitation cooling requirements. Materials and manufacturing considerations. Prerequisites: EnrE 211, Math 220.

384. DESIGN IN MATERIAL PROCESSES. 3 HOURS. Design and optimization of chemical and mechanical metallurgical processing systems. Process modeling and analysis. Direct search linear and dynamic programming solutions of process problems. Economic analysis and investment strategy. Prerequisite: MatE 243 or 244 or EnrE 234.

391. SEMINAR. 1 TO 4 HOURS. May be repeated for credit. Topics of mutual interest to a faculty member and a group of students. Offered as announced by department bulletin or the Timetable. Prerequisite: Consent of the instructor.

393. SPECIAL PROBLEMS. 2 TO 4 HOURS. Special problems or reading by special arrangement with the faculty. Prerequisite: Consent of the instructor.

396. SENIOR DESIGN I. 4 HOURS. Same as Bioengineering 396, Energy Engineering 396, Information Engineering 396, and Systems Engineering 396. Introduction to engineering economics, legal and social constraints on design, safety and reliability theory, and the use of simulation and optimization techniques in the engineering design process. Prerequisites: Senior standing and completion of all core requirements in the College of Engineering.

397. SENIOR DESIGN II. 4 HOURS. Same as Bioengineering 397, Energy Engineering 397, Information Engineering 397, and Systems Engineering 397. Application of principles of engineering and engineering design methodology to the solution of a large-scale design problem. May be taken in any department, regardless of area of concentration. Prerequisite: MatE 396.

Courses for Graduate Students

402. APPLIED ELASTICITY II. 4 HOURS. Development of classical plate equation and boundary conditions; solution of problems in rectangular and polar coordinates; energy principles, plates with variable thickness; large deflection theory; effect of shear deformations. Prerequisite: MatE 302.

403. THEORY OF ELASTICITY II. 4 HOURS. Review of complex variable theory, application to torsion, bending, and plane problem. The general three-dimensional problem, stress functions, singularities. Introduction to elastokinetics. Prerequisite: MatE 303.

404. PLASTICITY I. 4 HOURS. Basic postulates of plasticity. Yield conditions and associated flow laws. Torsion of cylindrical and prismatic bars. Generalized stresses and strain rates. Theorem of limit analysis. Application of limit analysis to plane problems, plates, and shells. Prerequisite: MatE 316.

406. THEORY OF SHELLS. 4 HOURS. Differential geometry, geometry of deformation, equations of equilibrium, energy theories, membrane theory, general bending theory. Application to shells of different geometry. Prerequisites: MatE 302, Math 322.

408. THEORY OF VISCOELASTICITY. 4 HOURS. Establishment of the field equations of viscoelastic materials and mathematical techniques of solving these equations. Prerequisites: MatE 303, Math 322.

409. ANALYSIS AND SYNTHESIS OF MECHANISMS III. 4 HOURS. Advanced analysis and synthesis of motion, emphasis on spatial mechanisms. Screw chains, dual numbers, quaternions. Matrix methods, stretch-rotation tensors, canonical systems and instantaneous invariants. Applications. Prerequisite: MatE 309.

411. VIBRATIONS OF STRUCTURAL ELEMENTS. 4 HOURS. Analytic and numerical treatment of vibrations in elastic strings, beams, plates, and other elements. Prerequisite: MatE 308.

412. WAVE PROPAGATION IN SOLIDS I. 4 HOURS. Stress wave propagation in solids; emphasis on waves involving one space variables in linear and nonlinear materials. Analytical and experimental techniques. Laboratory demonstrations. Prerequisites: MatE 302, Math 322.

413. WAVE PROPAGATION IN SOLIDS II. 4 HOURS. Wave propagation in solids that involve more than one space variable. Waves in a half-space due to a pulse on the surface or inside the half-space. Waves in cylindrical rods, beams, and plates. Scattering problems. Wave front analysis by geometrical optics. Prerequisite: MatE 412.

414. ANALYTICAL ENGINEERING DYNAMICS I. 4 HOURS. Lagrangian formulation of mechanics. Generalized kinematics. Partial rates of change of position and orientation. Lagrange's form of D'Alembert's principle. Lagrangian statics. Lagrange's equations of the first and second kind. Virtual work. Activity-energy. Prerequisite: Math 321.

415. ANALYTICAL ENGINEERING DYNAMICS II. 4 HOURS. Continuation of advanced mechanics. Integration of Lagrange's dynamical equations. Hamilton's canonical equations. The energy integral. Momentum integrals and cyclic coordinates. Canonical variables and transformations. The Hamilton-Jacobi equation. Prerequisite: MatE 414.

416. ANALYTICAL ENGINEERING DYNAMICS III. 4 HOURS. Variational approach to dynamics: Hamilton's principle, optimization techniques. Legendre transformations and Hamilton's equations. Introduction to relativistic dynamics. The Lorentz transformation. Prerequisite: MatE 415.

419. NONLINEAR CONTINUUM MECHANICS I. 4 HOURS. Same as Energy Engineering 419. Kinematics and fundamental laws of mechanics. General constitutive equations; reduced constitutive equations. Homogenous motions of simple bodies. Isotropic group, simple fluids, simple solids, simple subfluids. Examples. Prerequisite: MatE 316.

420. NONLINEAR CONTINUUM MECHANICS II. 4 HOURS. Same as Energy Engineering 420. Special classes of materials. Simple fluids, viscometric flows, the Weissenberg effect. Isotropic elastic materials, exact solutions. Wave propagation. Thermodynamics. Nonlinear viscoelastic materials, polar materials, and other materials. Prerequisite: MatE 419.

421.   STRUCTURAL ANALYSIS III. 4 HOURS. Applications of matrix, numerical, and computer techniques to the analysis of complex structural systems. Prerequisite: MatE 321 or the equivalent.

422.   ADVANCED DESIGN OF REINFORCED CONCRETE STRUCTURES. 4 HOURS. Behavior and design of reinforced concrete members subjected to flexure, shear, torsion, and compression; problems of bond failure, creep, and crack width control; limit design of continuous beams and yield line analysis of slabs; considerations of safety and probability in design codes. Prerequisite: MatE 255 or the equivalent.

423.   ELASTIC INSTABILITY I. 4 HOURS. Principles of elastic instability and their analytical, numerical, and experimental treatment. Buckling of columns, frames, rings. Lateral and torsional instability. Prerequisite: MatE 302. A knowledge of partial differential equations is required.

424.   ELASTIC INSTABILITY II. 4 HOURS. General discussion: small displacements superimposed on finite deformations; application to plates and shells; post-buckling analysis; dynamic instability. Prerequisite: MatE 423. A knowledge of partial differential equations is required.

425.   STRUCTURAL DYNAMICS. 4 HOURS. Development of discrete element and numerical techniques for structural dynamics problems; application to seismic and blast analysis. Prerequisite: MatE 308, 321.

432.   DISLOCATION THEORY. 4 HOURS. Nature of dislocation in crystals. Static and dynamic behavior. Interaction with solute atoms, precipitates, and other dislocations. Effect on mechanical properties. Dislocation interactions, reductions, and dislocation arrays. Prerequisite: MatE 316.

433.   ADVANCED MECHANICAL METALLURGY. 4 HOURS. Mechanical flows of metals and alloys from the standpoint of continuum mechanics. Application to basic metal-forming operations. Prerequisite: MatE 360.

434.   ADVANCED EXPERIMENTAL METHODS IN MATERIALS I. 4 HOURS. First of two courses covering the theoretical and operational aspects of advanced materials research methods at an advanced level. Design of complex experimental devices. Applications and limitations. Treatment of data. Principal topics include vacuum technology and temperature measurement and control. Prerequisite: MatE 333.

435.   ADVANCED EXPERIMENTAL METHODS IN MATERIALS II. 4 HOURS. Second of two courses covering the theoretical and operational aspects of materials research methods at an advanced level. Design of complex experimental devices. Applications and limitations, treatment of data. Principal topics include mechanical and physical property measurements under special environments. Prerequisite: MatE 434.

441.   MECHANICS OF MULTIPHASE SYSTEMS. 4 HOURS. Three-dimensional theory of multiphase media including effects of applied forces, thermo-osmosis, electro-osmosis, and chemical potentials. Three-dimensional theory of consolidation; derivation, solution by analytical and numerical means. Analysis of three-dimensional consolidation effects. Prerequisites: MatE 316, 341.

442.   STRENGTH AND DEFORMATION THEORIES OF SOIL. 4 HOURS. Theories of plasticity as applied to soil mechanics. Problems of limiting equilibrium.

Application of plasticity theories to problems of bearing capacity, earth pressure, and slope stability. Mechanics of granular systems. Prerequisites: MatE 316, 341. A knowledge of partial differential equations is required.

447.   ADVANCED SOIL ENGINEERING I. 4 HOURS. Analysis displacements of structures due to earth deformation. Site exploration; analysis of foundation types; shallow and deep foundations; settlements; bearing capacity. Retaining structures. Prerequisite: MatE 261.

461.   ADVANCED DEFORMATION PROCESSING I. 4 HOURS. Fundamental aspects of yielding and ductile failure in important deformation modes. Deformation of crystal aggregates and development of textures. Metallurgical changes during deformation. Effect of plastic flow on basic friction processes. Prerequisite: MatE 360.

462.   ADVANCED DEFORMATION PROCESSING II. 4 HOURS. Interactions between workpiece and equipment. Dynamic response of system. Design of process around material. Experimental techniques. Prerequisite: MatE 461.

463.   FUNDAMENTALS OF FRICTION, LUBRICATION, AND WEAR. 4 HOURS. Measurement and theories of friction. Adhesion between similar and dissimilar material pairs. Mechanisms of wear. Boundary, thin film, hydrodynamic and elastohydrodynamic lubrication. Prerequisite: MatE 230.

465.   ADVANCED METALLURGICAL THERMODYNAMICS. 4 HOURS. Treatment of multicomponent system thermodynamics with emphasis on metallurgical process applications. Development of relation between structure of metallic solutions, molten slats, and quasi-chemical models. Introduction to the relations between defects in nonmetallic crystal and the gas-phase composition. Prerequisite: EnrE 305.

466.   EMBRITTLEMENT PHENOMENA I. 4 HOURS. Phenomenology of mechanics of cracking or rupture originating from combinations of temperature, microstructure, environment, and stress. Prerequisite: MatE 333.

467.   EMBRITTLEMENT PHENOMENA II. 3 HOURS. Continues Materials Engineering 466. Prerequisite: MatE 466.

493.   SPECIAL PROBLEMS. 1 TO 4 HOURS. Special topics, seminars, or other special activities.

494.   SPECIAL TOPICS IN PROCESS METALLURGY. 0 TO 4 HOURS. May be repeated for a maximum of 12 hours. Selected topics of special interest in the design and analysis of mineral and metal production processes, including transport phenomena, physical chemistry, and design, control, and optimization problems. Prerequisite: MatE 248 or the equivalent.

495.   SPECIAL TOPICS IN PHYSICAL METALLURGY. 4 HOURS. May be repeated for a maximum of 12 hours. Selected topics of current interest drawn from such areas as structures, kinetics, diffusion, and quantitative metallography. Prerequisite: Consent of the instructor.

499.   THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Individual research: reading, design, analytical studies, or laboratory assignments. Culminates in report, master's thesis, or doctoral thesis. Examination on report or thesis is required.

MATHEMATICS

Professors: Joseph Landin, Head of the Department; A.O.L. Atkin, Norman Blackburn, Philip Dwinger, Irwin K. Feinstein, Paul Fong, David Foulser, Evelyn Frank, V.K.A.M. Gugenheim, Richard Handelsman, Christoph Hering, Noboru Ito, Shmuel Kantorovitz, Marvin Knopp, Louis L. Pennisi, Robert I. Soare, W.F. Stinespring, Victor Twersky

Associate Professors: Eugene M. Barston, Aldridge K. Bousfield, Verena H. Dyson, Brayton I. Gray, Morton E. Harris, Louise Hay, Melvin L. Heard, Jr., William A. Howard, James J. Kelleher, Richard G. Larson, Sue-Chin Lin, James W. Moeller, T.E.S. Raghavan, G.V. Ramanathan, Neil W. Rickert, Stanley L. Sclove, Martin C. Tangora, Philip D. Wagreich

Assistant Professors: John T. Baldwin, Joel D. Berman, Gerald L. Gordon, Floyd B. Hanson, Louis H. Kauffman, Jeffrey S. Leon, Jeff E. Lewis, John M. Masley, Kenneth W. Newman, John A. Sanders, Richard Scalzo

The department offers work leading to the Master of Arts, the Master of Science, the Master of Science in the Teaching of Mathematics, the Doctor of Arts, and the Doctor of Philosophy.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university, a grade point average of at least 3.75 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study, and an average of 4.00 in all mathematics courses beyond calculus. In exceptional cases, applicants who have averages of less than 3.75 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully.

Applicants must also present 30 quarter hours of undergraduate work in mathematics in addition to the usual beginning courses in algebra, trigonometry, analytic geometry, and calculus. For the Master of Science or Master of Arts in Mathematics, these 30 hours must include one year of work in analysis (equivalent to Mathematics 310, 311, 312) and one year of work in an introduction to higher algebra (equivalent to Mathematics 340, 341, 342). For the Master of Science in the Teaching of Mathematics, these 30 hours must include one course in advanced calculus (Math 310 or equivalent), two courses in higher algebra (Math 340 and 341 or equivalent), and at least one course concerned with the problems of teaching secondary school mathematics. The remaining hours should be mathematics courses at the 300 level (or their equivalents). Degree requirements are stated below.

Applicants are required to take the Graduate Record Examination (verbal and quantitative and advanced) and to submit three letters of recommendation from persons familiar with their academic work. If a candidate is admitted with deficiencies in courses normally required for admission, he must remove such deficiencies during the first three quarters of his attendance. No graduate credit is given for such courses.

Degree Requirements

Master of Arts and Master of Science in Mathematics

Forty-eight quarter hours are required for the degree, of which at least 36 must be in mathematics. At least 20 of the 36 hours must be in approved 400-level courses. Only 4 of these 20 hours may be in Mathematics 497. The candidate must pass a written examination, details of which may be obtained from the department director of graduate studies. A thesis is not required.

Master of Science in the Teaching of Mathematics

The purpose of this program is to strengthen the preparation of present and future secondary school teachers of mathematics and, in particular, to provide courses leading to certification in Illinois for those candidates who are not already certified.

The course requirements provide for the admission of students of varying undergraduate backgrounds and include a number of courses required in the undergraduate curriculum in teacher education in mathematics. Therefore, the requirements may be met either by work completed in the student's undergraduate program or by work done in his graduate program, but the graduate program must include 48 quarter hours of graduate credit.

A candidate must earn 48 quarter hours of graduate credit, of which 24 hours must be in mathematics, 12 hours in psychology or education, and 12 hours in electives. At the conclusion of this program the student must have completed, either as part of the required 48 quarter hours or as part of his admission requirements, the following:
1. Mathematics 310 and at least 4 quarter hours of analysis beyond Mathematics 310.
2. Mathematics 340, 341, and at least 4 quarter hours of algebra beyond Mathematics 341.
3. Mathematics 303, 304, 305, and at least 4 quarter hours of geometry beyond Mathematics 305.
4. At least 4 quarter hours in a course concerned with the problems of teaching secondary school mathematics.
5. At least 12 quarter hours of graduate credit in mathematics to be chosen, with the approval of his adviser, from logic, finite differences, number theory, history of mathematics, topology, computer science, probability and statistics, or other fields.
In addition, he must be eligible for a certificate to teach mathematics at the secondary level in Illinois. This requirement may be waived for candidates with teaching experience.

The psychology or education courses and the electives must be chosen with the approval of the adviser. In general, the electives are chosen from courses in mathematics, psychology, or education. In exceptional cases courses in other fields may be used as electives. Courses at the 400 level are not required for the degree.

Candidates whose undergraduate work is comparable to that required at Chicago Circle for a Bachelor of Science in the Teaching of Mathematics can fulfill the requirements in one year. A candidate who has not completed

comparable work in analysis, algebra, and geometry cannot expect to qualify for the degree in one year and will need more than 48 hours of course work to fulfill the requirements.

For further details concerning certification and any other requirements, candidates should consult the program adviser.

Doctor of Arts

The program leading to the Doctor of Arts in Mathematics requires the study of the major areas of mathematics and study and research in the methodology and techniques that make for the successful teaching of mathematics. The program is designed to train educators for undergraduate instruction in universities and in four-year, community, and junior colleges. A total of 144 hours of credit is required, distributed as follows:

- A. 60 quarter hours of mathematics, including Mathematics 332, 333, 355, 401, 402, 430, and 431. In addition, the student must obtain at least 4 quarter hours of credit in each of any four of the following areas: computer science, differential equations, geometry, logic, and probability and statistics. The remaining 16 quarter hours are selected by the student with the approval of his adviser. At least 32 of the 60 quarter hours must be taken in mathematics courses at the 400 level.
- B. 12 quarter hours of graduate courses in a related science, such as physics, chemistry, biology, geology, physical geography, or another science with the approval of the department.
- C. 24 quarter hours of graduate courses in education and mathematics education directed toward the improvement of university and junior college teaching.
- D. A teaching practicum, directed and supervised by members of the department, for which 8 quarter hours of credit are awarded. Doctor of Arts candidates who have had teaching experience may request a proficiency examination to satisfy the teaching practicum requirement. A committee of members of the department prepares and offers the examination.
- E. 8 quarter hours of electives restricted to mathematics and/or science. Courses in economics and statistical methods in psychology and education may, under certain conditions, be selected in this category.
- F. 32 quarter hours are devoted to the writing of a thesis, either an expository or historical treatment of a mathematics topic or a research report on mathematics education.

Each student is required to pass the department master's examination within one year of his having completed 48 quarter hours of credit, except that the student who already has a master's degree upon entering the program must pass the examination within one year of entrance. Within one year after a student has completed the teaching practicum and 120 hours of course credit, he must pass a preliminary examination in accordance with the rules of the Graduate College. Finally, the student must defend his thesis at a doctoral examination.

Doctor of Philosophy

Each candidate for the doctorate must pass the master's examination and must be recommended by the department for further work. A candidate who enters with a master's degree in mathematics from another institution must pass this examination within one year of his admission in order to remain in the program. In exceptional circumstances the department may extend this time limit.

The student chooses a major subject from the following: algebra, analysis, applied mathematics, geometry, logic, number theory, probability and statistics, or topology. He must also choose two internal minors from the preceding list or one internal minor and one outside minor or a full outside minor. The choice of an outside minor must have the approval of the Department of Mathematics; the requirements should be checked with the department concerned. The student presents at least 60 quarter hours in 400-level mathematics courses unless he has chosen a full outside minor that requires 48 hours. At least three 400-level courses are required for each internal minor, and they must have the approval of the department. The student is required to have 144 hours of graduate credit, of which 48 hours is usually thesis credit.

Shortly before the completion of 96 hours of graduate course work, the student should select an adviser to direct a thesis in his major area of interest. As soon as possible thereafter, the student must take a preliminary examination, the purpose of which is to determine if he is prepared to undertake a doctoral research program. The exact point in the student's career at which the preliminary examination must be taken is not rigidly fixed, but the department will normally drop a student who has not passed the preliminary examination within one year of completion of the 96 hours of course work. In exceptional circumstances the department may extend this time limit. Further details regarding the examination may be obtained from the director of graduate studies.

The student must demonstrate reading proficiency in any two of French, German, or Russian.

Since the purpose of the doctoral program is to provide training in mathematical research and scholarship, the crucial effort is the production of a thesis; therefore, under the guidance of the department, the student writes a thesis that is a significant piece of mathematical research acceptable to the department.

Courses for Graduate and Advanced Undergraduate Students

300.   TEACHERS COURSE I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Graduate credit for this course may be applied only toward the course requirements for the Master of Science in the Teaching of Mathematics. Important mathematical concepts and the problems involved in the teaching thereof; treatment of numeration systems, set relations, functions, whole numbers, logic, and proof; examination of some of the major new curricula. Prerequisite: Math 133.

301. TEACHERS COURSE II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Graduate credit for this course may be applied only toward the course requirements for the Master of Science in the Teaching of Mathematics. Continues Mathematics 300. Topics, discussed from an advanced viewpoint, include mathematical induction, the completeness axiom, composition of functions, sequences, a vector approach to geometry, axioms of the Hilbert type. Prerequisite: Math 300.

302. TEACHERS COURSE III. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Graduate credit for this course may be applied only toward the course requirements for the Master of Science in the Teaching of Mathematics. Continues Mathematics 301. Topics, discussed from an advanced viewpoint, include arithmetic and geometric progressions, continued sums and products, difference sequences, pigeonhole functions, circular functions, combinations and permutations. Prerequisite: Math 301.

303. ADVANCED EUCLIDEAN GEOMETRY I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Graduate credit for this course may be applied only toward the course requirements for the Master of Science in the Teaching of Mathematics. Geometry from Euclid to the present, equivalents of Euclid's fifth postulate, noneuclidean geometries, invariants of configurations under transformation. Prerequisite: Math 133.

304. ADVANCED EUCLIDEAN GEOMETRY II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Graduate credit for this course may be applied only toward the course requirements for the Master of Science in the Teaching of Mathematics. The parallel postulate, similarity, area, perpendicularity, circles and spheres, constructions with ruler and compass. Prerequisite: Math 303.

305. ADVANCED EUCLIDEAN GEOMETRY III. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Graduate credit for this course may be applied only toward the course requirements for the Master of Science in the Teaching of Mathematics. Ruler and compass constructions, proportionality, length and area, solid mensuration, hyperbolic geometry. Prerequisite: Math 304.

307. THEORY OF SETS AND THE REAL NUMBER SYSTEM. 5 HOURS. The elementary set theory and the development of the integers, the rational numbers, and the real numbers. Prequisite: Math 133.

309. TOPICS IN THE TEACHING OF MATHEMATICS. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. May be repeated for credit. No more than 8 hours may be used toward the Master of Science in the Teaching of Mathematics. Seminars, conferences, or sections on special topics and advanced problems for students majoring in mathematics education and for in-service teachers who wish to study new-curriculum development and special problems in teaching mathematics. Prerequisite: Math 302.

310. ADVANCED CALCULUS I. 4 HOURS. Differential and integral calculus of vector fields, vector functions, partial differentiation, transformations, improper integrals, double and triple integrals, and applications. Prerequisite: Math 133.

311. ADVANCED CALCULUS II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Line and surface integrals, Green's theorem, Stokes's theorem, sequence, infinite series, uniform convergence. Prerequisite: Math 310.

312.   ADVANCED CALCULUS III. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. A set of advanced topics selected for applications in the physical sciences and in engineering. Prerequisite: Math 311.

313.   ANALYSIS I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. The real numbers, countable and uncountable sets, the topology of the reals, compactness, convergent and divergent sequences, Cauchy sequences, infinite series, convergence tests, rearrangements, the topology of n-space, continuous functions and their properties. Prerequisite: Math 133.

314.   ANALYSIS II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. The derivative, mean value theorems, Taylor's theorem with remainder, the Riemann integral, integrability of continuous functions, the fundamental theorem of calculus, convergence of sequences and series of functions, uniform convergence, conditions for piece wise differentiability and integrability, power series. Prerequisite: Math 313.

315.   ANALYSIS III. 4 HOURS. Differentiation in n-space, partial derivatives, the derivative as a linear approximation, inverse and implicit function theorems, integration in R^n, change of variables in integration, differential forms and integration of differential forms. Stokes's theorem. Prerequisite: Math 314.

321.   ELEMENTARY DIFFERENTIAL EQUATIONS II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Systems of linear first order equations. Boundary value problems for second order linear equations, introduction to partial differential equations. Nonlinear problems described by one or two differential equations of the first order. Prerequisite: Math 220.

322.   ELEMENTARY PARTIAL DIFFERENTIAL EQUATIONS I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Second order partial differential equations and their initial value and boundary value problems. Separations of variables and Green's formula considerations. Eigenfunction expansions for homogeneous and inhomogeneous heat equation in finite domains. Sturm-Liouville problem. Fourier series. Prerequisites: Math 310 or 313 and Math 321.

323.   ELEMENTARY PARTIAL DIFFERENTIAL EQUATIONS II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. The potential equation and the wave equation in finite domains. Semi-infinite and infinite domains. Fourier integrals. Cylindrical and spherical harmonics. Fourier-Bessel and Legendre-Bessel expansions. Prerequisite: Math 322.

324.   SPECIAL FUNCTIONS IN PURE AND APPLIED MATHEMATICS I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Special functions, including gamma, beta, cylinder, hypergeometric, and Bessel functions, as they occur in pure and applied mathematics and engineering. Prerequisite: Credit or registration in Math 321.

325.   SPECIAL FUNCTIONS IN PURE AND APPLIED MATHEMATICS II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Special functions and polynomials, including orthogonal, Legendre, Hermite, Laguerre, and Jacobi polynomials, as they occur in pure and applied mathematics and engineering. Prerequisite: Math 324.

326.   SPECIAL FUNCTIONS IN PURE AND APPLIED MATHEMATICS III. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Special functions, including hypergeometric and Bessel functions, generating functions, and orthogonal, Legendre, Hermite, Laguerre, and Jacobi polynomials. Prerequisite: Math 325.

330.   COMPLEX ANALYSIS FOR APPLICATIONS I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Credit is not given for both Mathematics 330 and 332. Complex numbers and their geometrical representation, analytic functions, elementary functions, complex integration, Taylor and Laurent series, the calculus of residues, introduction to conformal mapping. Prerequisite: Math 310 or 313.

331.   COMPLEX ANALYSIS FOR APPLICATIONS II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Branch-point integration, series and product expansions, complex integral representations of special functions (gamma, hypergeometric, Legendre, Bessel), asymptotic methods, introduction to transforms. Prerequisites: Math 321, 330.

332.   COMPLEX VARIABLES I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Credit is not given for both Mathematics 332 and 330. Power series in one variable, holomorphic functions, Cauchy's integral theorem, Taylor and Laurent expansions. Prerequisite: Math 312 or 315 or the equivalent.

333.   COMPLEX VARIABLES II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Analytic functions of several complex variables, harmonic functions, convergence of sequences of holomorphic functions, infinite products, normal families, holomorphic transformations, holomorphic systems of differential equations. Prerequisites: Math 332.

340.   MODERN HIGHER ALGEBRA I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Sets and real numbers, groups, rings. Prerequisite: Math 133.

341.   MODERN HIGHER ALGEBRA II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Euclidean and polynomial rings, vector spaces, linear transformations, and matrices. Prerequisite: Math 340.

342.   MODERN HIGHER ALGEBRA III. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Dual spaces, inner products spaces, modules, canonical forms of matrices, quadratic forms. Prerequisite: Math 341.

343.   FORMAL LOGIC I. 4 HOURS. Same as Philosophy 343. Propositional logic, logic of quantifiers, and identity and completeness. Prerequisite: Consent of the instructor; none for mathematics majors.

344.   FORMAL LOGIC II. 4 HOURS. Same as Philosophy 344. Continues Mathematics 343. Mathematical analysis of decidability and computability. Arithmetization of syntax. Incompleteness and undefinability theorems. Introduction to axiomatic set theory. Prerequisite: Math 343.

348.   LINEAR TRANSFORMATIONS AND MATRICES. 5 HOURS. Matrix algebra, determinants, inverses of matrices, rank and equivalence, linear independence, vector spaces and linear transformation, unitary and orthogonal transformations, characteristic equation of a matrix. Prerequisite: Math 133.

350. INTRODUCTION TO HIGHER GEOMETRY I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Projective properties in the euclidean plane, extending the euclidean plane, the projective plane, axioms for the projective plane, conics, introduction to coordinates. Prerequisite: Math 342.

351. INTRODUCTION TO HIGHER GEOMETRY II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Topics in geometry, projective planes, higher dimensional projective geometries, model as subspaces of a vector space, coordinatization. Prerequisite: Math 350.

353. INTRODUCTION TO DIFFERENTIAL GEOMETRY. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Curves, surfaces, manifolds imbedded in euclidean space, Riemannian geometry, first and second fundamental forms of imbedded surfaces. Prerequisite: Math 312 or 315.

355. INTRODUCTION TO TOPOLOGY I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Set theory, topological spaces, metric spaces, continuous maps, connectedness, compactness, separation axioms, completely separable spaces, mappings into Hilbert spaces. Prerequisite: Math 310 or 313.

356. INTRODUCTION TO TOPOLOGY II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Locally connected spaces, arcs and arcwise connectivity, Cantor sets, Hahn-Mazurkiewicz theorem, elements of homotopy theory. Prerequisites: Math 340, 355.

357. INTRODUCTION TO TOPOLOGY III. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Vector spaces, polytopes, homology theory, Euler-Poincare formula, simplicial mappings, Brouwer degree and Brouwer fixed-point theorem. Prerequisite: Math 356.

358. STATISTICAL METHODS. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Statistical concepts, techniques, and methods. Topics include probability theory and models, statistical estimation, confidence limits, and hypothesis testing. Prerequisite: Math 133.

360. ELEMENTARY THEORY OF NUMBERS I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. The basic concepts: divisibility, prime numbers congruences, quadratic reciprocity law. Prerequisite: Math 133 or approval of the department.

361. THEORY OF NUMBERS II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Functions of number theory, recurrence functions, diophantine equations, quadratic forms, Farey sequences and rational approximations. Prerequisite: Math 360.

362. THEORY OF NUMBERS III. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Continued fractions, distribution of primes, algebraic numbers, polynomials, partitions, density of sequences of integers. Prerequisite: Math 361.

366. INTRODUCTION TO THE MATHEMATICAL METHODS OF THEORETICAL PHYSICS I. 4 HOURS. Same as Physics 366. The traditional mathematical methods of theoretical physics from an intuitive point of view. Applications to problem-solving in electrostatics and classical and quantum mechanics. Matrices and linear transformations, Fourier analysis, the partial differential equations of physics, and Sturm-Liouville theory. Introduction to special functions frequently encountered in physics. Prerequisites: Math 310, 321, Phys 303, 322, 342.

367. INTRODUCTION TO THE MATHEMATICAL METHODS OF THEORETICAL PHYSICS II. 4 HOURS. Same as Physics 367. The traditional mathematical methods of theoretical physics from an intuitive point of view. Applications to problem-solving in electrostatics, electrodynamics, and classical and quantum mechanics. The special functions frequently encountered in physics and their use in the solution of boundary value problems, power series solutions, Green's functions, contour integral representations, and additional uses. Prerequisite: Math 366.

370. INTRODUCTION TO PROBABILITY. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Credit is not given for both Mathematics 370 and 358. Probability models, univariate and multivariate distributions, random variables. Prerequisite: Math 133.

371. MATHEMATICAL STATISTICS I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Statistical problems and procedures, estimation, testing hypotheses, distribution theory. Prerequisite: Math 370 or 358.

372. MATHEMATICAL STATISTICS II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. One-sample problems, comparison, linear models, and analysis of variance. Prerequisite: Math 371.

375. PROBABILITY. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDER-GRADUATE. Law of large numbers, central limit theorem, recurrent events, random walks, Markov chains. Prerequisite: Math 370.

377. FINITE DIFFERENCES I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Difference formulas, finite integration, summation of series, Bernoulli and Euler polynomials, interpolation. Prerequisite: Math 112 or 133.

378. FINITE DIFFERENCES II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Approximate integration, beta and gamma functions, difference equations. Prerequisite: Math 377.

380. PROBLEMS IN GRAPH THEORY. 4 HOURS. May be substituted for Systems Engineering 460. Credit is not given for both Mathematics 380 and Systems Engineering 460. Same as Quantitative Methods 380. Optimization problems: theory and solution. Shortest path problems. Transportation problems: maximum flows, dynamic flows, parametric flows. Matching problems: coverings, spanning trees, perfect graphs. Urban scheduling problems: traveling salesman problem, postman problem. Prerequisite: QM 376.

381. VECTOR AND TENSOR ANALYSIS I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Algebra of vectors, vector differential calculus, differential geometry, Stokes's theorem, divergence theorem, applications to electricity, mechanics, hydrodynamics, and elasticity. Prerequisite: Math 311 or 314.

382. VECTOR AND TENSOR ANALYSIS II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Transformation properties, covariant and contra-variant tensors, differential geometry of curves and surfaces, exterior differential calculus with emphasis on aspects of interest in science and engineering. Prerequisite: Math 381.

383.   INTRODUCTION TO GAME THEORY. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Matrix games, saddle point, mixed strategies, zero-sum-two-person games, minimax theorem, examples from parlor games, poker, war games; computing value and optimal strategies using simplex method. Prerequisite: Math 370.

385.   LAPLACE TRANSFORM. 3 HOURS. The Laplace transform and its inverse; properties of the transform; linear differential equations (ordinary and partial); linear difference equations, gamma, error, and Bessel functions; asymptotic series; nonelementary integrals; integral equations; Hankel transforms. Prerequisite: Math 330.

387.   NUMERICAL ANALYSIS I. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. A comprehensive introduction to linear numerical analysis. Computational methods and error analysis for matrix inversion, eigenvalues and eigenvectors, and linear approximations. Prerequisites: Math 133 and 194 or 195.

388.   NUMERICAL ANALYSIS II. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Continues Mathematics 387. Prerequisite: Math 387.

389.   NUMERICAL ANALYSIS III. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Numerical integration and differentiation. Quadrature in n dimensions. Numerical integration of ordinary differential equations. Prerequisite: Math 388.

391.   BOOLEAN ALGEBRA AND SWITCHING THEORY. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Sets, relations, functions, equivalence relations, abstract Boolean algebra. Applications of Boolean algebra. Minimization of Boolean functions. Representation of finite Boolean algebras. Prerequisite: Math 310 or 313 or 340.

392.   INTRODUCTION TO AUTOMATA THEORY. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Boolean rings and lattices as Boolean algebras. Synchronous sequential circuits. Mealy and Moore models of automata. Regular sets. Prerequisite: Math 391.

393.   AUTOMATA AND LANGUAGES. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Types of automata and their events. The semigroup of an automaton. Basic decomposition theory. Introduction to formal languages. Grammars of types 0, 1, 2, 3. Properties of context-free languages. Prerequisite: Math 392.

394.   SIMULATION LANGUAGES. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Digital simulation of complex systems; general purpose and special simulation languages and their useful properties, their design and implementation. A comparison and evaluation of special languages, such as GPSS II, SIMPSCRIPT, GASP, SIMPAC, DYNAMO, and SIMULATE; application of at least one of them in a term project. Prerequisites: Math 280, 281 or the equivalents.

395.   LIST-PROCESSING LANGUAGES. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. List- and string-processing languages, such as IPLV, SLIP, COMIT, SNOBOL, and LISP, from the user's point of view. Applications to nonnumeric problems, such as symbolic formula manipulation, information retrieval, and pattern recognition. Prerequisites: Math 280, 281 or the equivalents.

396. DESIGN OF COMPILERS. 4 HOURS, GRADUATE CREDIT: 3 HOURS, UNDERGRADUATE. Design and implementation of algebraic compilers for a modern digital computer. Prerequisites: Math 280, 281.

397. COMPUTER OPERATING SYSTEMS. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. Problems of planning and implementing an operating system for a modern digital computer so as to utilize its power to the fullest possible extent. Prerequisite: Math 281.

398. SPECIAL TOPICS IN MATHEMATICS. 1 TO 4 HOURS. May be repeated for credit. Course content is announced prior to each quarter in which it is given. Prerequisite: Consent of the instructor.

399. HONORS IN MATHEMATICS. 4 HOURS, GRADUATE CREDIT; 3 HOURS, UNDERGRADUATE. May be repeated for credit. Seminars on special topics and advanced problems permit students majoring in mathematics to do independent study under the guidance of senior members of the staff. Prerequisites: Math 312, 342.

Courses for Graduate Students

401. SECOND COURSE IN ABSTRACT ALGEBRA I. 4 HOURS. Isomorphism theorems, permutation groups, finite groups, Sylow's theorems, structure of finitely generated Abelian groups, composition series, solvable groups. Prerequisite: Math 342 or the equivalent.

402. SECOND COURSE IN ABSTRACT ALGEBRA II. 4 HOURS. Field extensions, finite fields, Galois theory, Wedderburn's theorem. Prerequisite: Math 401.

403. SECOND COURSE IN ABSTRACT ALGEBRA III. 4 HOURS. Rings and algebras, structure of algebras, multilinear algebra, tensor products. Prerequisite: Math 402.

404. RINGS AND MODULES. 4 HOURS. The category of R-modules, projective and injective modules, the Morita theorems, elementary homological algebra, separable algebras, homological dimension. Prerequisite: Math 403.

405. FINITE GROUPS. 4 HOURS. Transfer theorems, p-nilpotent groups, E_π, C_π, D_π, properties, solvable groups, Schur-Zassenhaus theorem, additional topics selected by the instructor. Prerequisite: Math 403.

406. FREE GROUPS AND UNIVERSAL PROPERTIES. 4 HOURS. Universal algebras, words and varieties, free algebras, free groups, subgroups of free groups, free products, free associative algebras, Birkhoff-Witt theorem, free Lie algebras. Prerequisite: Math 403.

407. REPRESENTATION THEORY. 4 HOURS. Representation theory of finite-dimensional algebras, structure of the regular representation, characters, applications to finite groups, theorems of Frobenius and Burnside, character ring, exceptional characters. Prerequisite: Math 403.

408. HOMOLOGICAL ALGEBRA I. 4 HOURS. Abstract categories and functors, adjoints, additive and Abelian categories, functor categories. Prerequisite: Math 403.

409.   HOMOLOGICAL ALGEBRA II. 4 HOURS. Complexes, homology, projectives and injectives, connected sequences of functors, satellites, derived functors, ext, tor, the full embedding theorem. Prerequisite: Math 408.

410.   NONASSOCIATIVE ALGEBRAS I. 4 HOURS. Introduction to nonassociative algebras, alternative algebras, power associative algebras, Jordan algebras. Prerequisite: Math 403.

411.   NONASSOCIATIVE ALGEBRAS II. 4 HOURS. Jordan algebras continued, Lie algebras, general classification theorems. Prerequisite: Math 410.

415.   LATTICE THEORY I. 4 HOURS. Introduction to the theory of lattices and partially ordered sets. Modular and distributive lattices, prime ideal theorem, Boolean algebras. Prerequisites: Math 342, 356.

416.   LATTICE THEORY II. 4 HOURS. Continues Mathematics 415. Representation theory of distributive lattices and its applications, Boolean algebras in particular. Prerequisite: Math 415.

417.   LATTICE THEORY III. 4 HOURS. Special topics. Pseudocomplemented, distributive lattices, Post algebras, Heyting algebras, Stone algebras, Lukasiewics algebras, de Morgan algebras, alpha complete lattices and their representation theory. Prerequisite: Math 416.

419.   ADVANCED TOPICS IN ALGEBRA. 4 HOURS. May be repeated for credit. Special topics. Prerequisite: Consent of the instructor.

421.   ALGEBRAIC TOPOLOGY I. 4 HOURS. The category of topological spaces and functors, homology of complexes, singular homology theory, Eilenberg-Steenrod axioms, C-W complex, cohomology and cup-products, universal coefficient theorem. Kunneth theorem. Prerequisites: Math 342 and 357 or the equivalent.

422.   ALGEBRAIC TOPOLOGY II. 4 HOURS. Homotopy groups, Hurewicz theorem, Whitehead theorem, fiber spaces, Postnikow sections, obstruction theory, Serre spectral sequence, e-theory, applications. Prerequisite: Math 421.

423.   ALGEBRAIC TOPOLOGY III. 4 HOURS. Freudenthal suspension theorem, stable homotopy theory, cohomology operations, construction and cohomology of Eilenberg-MacLane spaces, structure of the Steenrod algebra, Adams spectral sequence. Prerequisite: Math 422.

424.   SEMINAR ON MATHEMATICS CURRICULA. 4 HOURS. Analysis of the objectives and goals of undergraduate mathematics programs. Prerequisite: Admission to the Doctor of Arts program in mathematics.

427.   SEMINAR ON TEACHING MATHEMATICS IN FOUR-YEAR COLLEGES. 4 HOURS. Analysis of the teaching of the precalculus, calculus, and post calculus courses in four-year colleges. Prerequisite: Math 424.

429.   ADVANCED TOPICS IN TOPOLOGY. 4 HOURS. May be repeated for credit. Special topics. Prerequisite: Consent of the instructor.

430.   REAL ANALYSIS I. 4 HOURS. Set theory, well-ordering cardinal and ordinal numbers, metric spaces, connectedness, compactness, completeness. Prerequisite: Math 312, 315 or the equivalent.

431.   REAL ANALYSIS II. 4 HOURS. Riemann-Stieltjes integral and its extension, measures and measurable sets, measurable functions, the Lebesque integral. Prerequisite: Math 430.

433.   INTEGRAL EQUATIONS. 4 HOURS. Fredholm and Hilbert-Schmidt theory and applications, symmetric kernels and orthogonal systems of functions, some types of singular and nonlinear integral equations. Prerequisite: Math 312 or 315 or the equivalent.

434.   TRANSFORM METHODS. 4 HOURS. Mellin and Hankel transforms, multiple Fourier transforms; applications to conduction of heat in solids, to slowing down of neutrons in matter, and to atomic and nuclear physics. Prerequisites: Math 312 or 315 and 331 or 333 or the equivalents.

435.   CALCULUS OF VARIATIONS. 4 HOURS. Introductory problems; geodesics, the brachistochrone, minimal surface of revolution. Isoperimetric problems. Geometrical optics, Fermat's principle. Dynamics of particles. Minimum characterization of the eigenvalue-eigenfunction problem. Ritz's method of approximation. Prerequisite: Math 312 or 315 or the equivalent.

436.   FUNCTIONAL ANALYSIS I. 4 HOURS. Topological vector spaces, Banach spaces, Hilbert spaces, Hahn-Banach theorem, interior mapping principle, uniform boundedness principle, applications, approximation and closure theorems. Prerequisite: Math 432.

437.   FUNCTIONAL ANALYSIS II. 4 HOURS. Linear operators on a Banach space, the spectrum and resolvent of a linear operator, compact operators, spectral theorem for compact Hermitian operators on a Hilbert space, integral equations, Sturm-Liouville theory. Prerequisite: Math 436.

438.   FUNCTIONAL ANALYSIS III. 4 HOURS. Spectral theorem for normal operators on a Hilbert space, unbounded operators, semigroups of linear operators, ergodic theorems. H^p spaces of analytic functions, Beurling's theorem on the shift operator, applications. Prerequisite: Math 437.

440.   PARTIAL DIFFERENTIAL EQUATIONS I. 4 HOURS. Classification of equations and characteristics. The Cauchy-Kowalewski theorem. The Cauchy problem for hyperbolic systems in the plane and space of higher dimension. Uniqueness theorems for the Cauchy problem. Prerequisites: Math 323, 331 or 333, and 342 or 348.

441.   PARTIAL DIFFERENTIAL EQUATIONS II. 4 HOURS. Elliptic equations; method of balayage; Dirichlet's principle; fundamental solutions; potential theory; eigenvalue problems. Prerequisite: Math 440.

442.   PARTIAL DIFFERENTIAL EQUATIONS III. 4 HOURS. Partial differential equations of parabolic type. Distributions and weak solutions of partial differential equations. Elliptic boundary value problems. Prerequisites: Math 436, 441.

445.   COMPLEX ANALYSIS I. 4 HOURS. Theorems of Mitlag-Leffler, Weierstrass, and Runge. Entire functions and Hadamard's theorem. Analytic continuation. The Riemann mapping theorem. Prerequisite: Math 431.

446.   COMPLEX ANALYSIS II. 4 HOURS. Continues Mathematics 445. Harmonic and subharmonic functions. The Dirichlet problem. Potential theory and Green's functions. Elliptic functions. Introduction to Riemann surfaces. The Picard theorem. Prerequisite: Math 445.

449. ADVANCED TOPICS IN ANALYSIS. 4 HOURS. May be repeated for credit. Special topics. Prerequisite: Consent of the instructor.

450. PROJECTIVE GEOMETRY I. 4 HOURS. Coordinatization, collineation groups, Desargues's condition, weakened forms of Desargues's condition and corresponding coordinate systems, fundamental theorem of projective geometry. Prerequisite: Consent of the instructor.

451. PROJECTIVE GEOMETRY II. 4 HOURS. Finite planes, free planes, collineations of division ring planes and of free planes, the Lenz-Barlotti classification. Prerequisite: Math 450.

452. DIFFERENTIAL GEOMETRY I. 4 HOURS. Manifolds, tensor fields, the tensor algebra, the Grassman algebra, exterior differentiation, mappings, transformations of vector fields and differential forms, affine connections, parallelism, the exponential mappings, covariant differentiation. Prerequisite: Consent of the instructor.

453. DIFFERENTIAL GEOMETRY II. 4 HOURS. The Riemannian connection, complete Riemannian manifolds, isometries, curvature, Lie groups. Prerequisite: Math 452.

454. STRUCTURE OF DIFFERENTIABLE MANIFOLDS I. 4 HOURS. Tangent bundle, vector fields, tensors, differentiable mappings, geodesics, exponential mapping, Whitney embedding theorem, Morse theory. Prerequisite: Credit or registration in Math 421 and 430.

455. STRUCTURE OF DIFFERENTIABLE MANIFOLDS II. 4 HOURS. De Rham theorem, duality, vector bundles, characteristic classes, Hirzebruch index theorem, almost complete structures, Milnor spheres. Prerequisite: Math 454.

456. STRUCTURE OF DIFFERENTIABLE MANIFOLDS III. 4 HOURS. Poincare conjecture, structures on manifolds, cobordism theorem, embeddings and immersions, Atiyah-Singer index theorem, Lie groups and Lie algebras, Bott periodicity theorem. Prerequisite: Math 455.

459. ADVANCED TOPICS IN GEOMETRY. 4 HOURS. May be repeated for credit. Special topics. Prerequisite: Consent of the instructor.

460. RECURSION THEORY I. 4 HOURS. Same as Philosophy 460. Introduction to the theory of recursive functions, Turing machines, and effective computability. Godel's incompleteness theorem. Prerequisite: Math 334.

461. RECURSION THEORY II. 4 HOURS. Same as Philosophy 461. Classification of recursively enumerable sets, Post's problem, degrees of unsolvability, the arithmetical hierarchy. Prerequisite: Math 460.

462. METAMATHEMATICS I. 4 HOURS. Same as Philosophy 462. Classical first order logic, axiomatic theories, model theory. Prerequisite: Math 344.

463. METAMATHEMATICS II. 4 HOURS. Same as Philosophy 463. Incompleteness, undecidability, nondefinability. Prerequisite: Math 462.

464. METAMATHEMATICS III. 4 HOURS. Same as Philosophy 464. Higher order logic, infinitary logic, proof theory. Prerequisite: Math 463.

465. ADVANCED SET THEORY I. 4 HOURS. Same as Philosophy 465. Axiomatic set theory, consistency of the continuum hypothesis, and the axiom of choice. Prerequisite: Consent of the instructor.

466. ADVANCED SET THEORY II. 4 HOURS. Same as Philosophy 466. Strong infinity axioms. Independence of the continuum hypothesis and the axiom of choice from Zermelo-Fraenkel's axioms. Prerequisite: Math 465.

469. ADVANCED TOPICS IN MATHEMATICAL LOGIC. 4 HOURS. May be repeated for credit. Same as Philosophy 469. Special topics. Prerequisite: Math 344.

470. PROBABILITY THEORY I. 4 HOURS. Measure-theoretic aspects of probability theory, characteristic functions, the inversion theorem, the Levy-Cramer continuity theorem, Bochner's theorem, Cramer's theorem and the Herglotz lemma, types of convergence, the Borel-Cantelli lemma, the zero-one law, the law of large numbers, central limit theorems of Lindeberg, Liapunov, and Lindeberg-Feller. Prerequisite: Math 432.

471. PROBABILITY THEORY II. 4 HOURS. The central limit problem, conditional probability, martingales, random walk and recurrent events, Markov processes with discrete and continuous parameters, general introduction to processes with independent increments and orthogonal increments, stationary processes, least square prediction. Prerequisite: Math 470.

477. ADVANCED STATISTICAL THEORY. 4 HOURS. Intensive study of fundamental topics: sampling distributions, sufficient statistics; estimation, tests of statistical hypothesis; large sample theory; general theory of linear statistical models; sequential methods. Prerequisite: Math 372.

480. SCATTERING THEORY I. 4 HOURS. Solutions of the reduced wave equations for scattering of scalar, vector, and dyadic waves; separable and nonseparable problems. Representations: Green's function integrals, complex integrals, inverse distance series, special function series; approximations; geometrical optics and potential theory; applications. Prerequisites: Math 323, 331, Phys 371.

481. SCATTERING THEORY II. 4 HOURS. Representations, theorems, and approximations for many-body problems. Multiple scattering solutions as functionals of single-body functions: integral equations, algebraic equations, series representations, operational closed forms, asymptotic forms. Two-scatterer problems, arbitrary configurations, and periodic arrays. Prerequisite: Math 480.

482. SCATTERING THEORY III. 4 HOURS. Statistical scattering problems. Scattering by rough surfaces, gases, and liquids. Relations between scatterer statistics and signal statistics for low-speed distributions. Relativistic scattering problems. Prerequisite: Math 481.

484. INTRODUCTION TO APPLIED ANALYSIS I. 4 HOURS. Linear vector spaces; introduction to Banach space; contraction mapping theorem; existence and uniqueness theorems for ordinary differential equations; linear ordinary differential equations and systems. Prerequisites: Math 312 and 341 or 348.

485. INTRODUCTION TO APPLIED ANALYSIS II. 4 HOURS. Pre-Hilbert and Hilbert space; linear symmetric compact operators; Sturm-Liouville theory; minimax principles and completeness of eigenfunctions; linear partial differential equations; Green's functions; applications to electromagnetic theory and continuum mechanics. Prerequisite: Math 484.

489. ADVANCED TOPICS IN APPLIED MATHEMATICS. 4 HOURS. May be repeated for credit. Special topics. Prerequisite: Consent of the instructor.

490. COMPUTER PROGRAMMING FOR STUDENTS IN BEHAVIORAL SCIENCES. 0 HOURS. Seven-week introduction to Fortran IV. Examples from statistics, business, and the behavioral sciences. The Computer Center cooperates with departments imposing a language requirement in programming in setting examinations for this course.

491. COMPUTER PROGRAMMING FOR STUDENTS IN THE PHYSICAL SCIENCES. 0 HOURS. Seven-week introduction to Fortran IV. Examples from mathematics, engineering, and the natural sciences. The Computer Center cooperates with departments imposing a language requirement in programming in setting examinations for this course.

492. NUMERICAL METHODS IN PARTIAL DIFFERENTIAL EQUATIONS I. 4 HOURS. Classification of equations and boundary value problems; finite difference analogues for parabolic, hyperbolic, and elliptic equations; explicit and implicit methods of parabolic and hyperparabolic systems; the method of characteristics for hyperbolic equations; stability of initial value problems; iterative methods (modern and classical) for elliptic equations; discretization and round-off errors. Prerequisites: Math 323 and 389 or the equivalents.

493. NUMERICAL METHODS IN PARTIAL DIFFERENTIAL EQUATIONS II. 4 HOURS. Continues Mathematics 492. Prerequisite: Math 492.

495. APPROXIMATION THEORY. 4 HOURS. General approximation theory in normed linear spaces with primary emphasis on functions defined on an interval and periodic function; existence and uniqueness theorems; characterization of Chebyshev approximants; degree of approximation; use of approximations in computing. Prerequisites: Math 312 or 315 and 342 or 348 or the equivalents.

497. PROBLEM SEMINAR. 4 HOURS. Emphasis on solving mathematical problems requiring techniques from many mathematical disciplines, including real and complex analysis, linear algebra, group theory, differential and integral equations, and variational calculus. Prerequisite: Approval of the department.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Prerequisite: Approval of the department.

PHILOSOPHY

Myles Brand, Chairman of the Department

Professors: George T. Dickie, Arthur I. Fine, Brian K. Skyrms, Irving Thalberg

Associate Professors: Sandra Bartky, David C. Blumenfeld, Myles Brand, Ralf Meerbote, Paul R. Teller, W. Kent Wilson

Assistant Professors: Neal K. Grossman, Dorothy Grover, Richard Kraut

The department offers work leading to the Master of Arts and the Doctor of Philosophy.

Admission Requirements

Applicants are considered on an individual basis. They should have completed courses in modern formal logic, ethics, history of philosophy, epistemology, metaphysics, and philosophy of science, but an undergraduate major in philosophy is not required. In addition, applicants must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study. In exceptional cases, students who have averages of less than 4.00 but above 3.75 or whose preparation in philosophy is inadequate may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Such students may be admitted on limited status and will be required to remedy department deficiencies before being admitted to regular status.

Degree Requirements

Master of Arts

A student must choose at least one course in each of the following areas: history of philosophy; the theory of knowledge, including logic, philosophy of science, and the philosophy of language; and the theory of value, including ethics and aesthetics. The department also requires the student to complete a unified program of 48 quarter hours of graduate study under the direction of an adviser.

Doctor of Philosophy

A full program consists of 16 hours of course work each quarter or a total of 144 quarter hours for the degree. The student must complete all requirements within seven years after entering the program. A student carrying a full program is generally expected to complete the requirements in fewer than five years. Exceptions are permitted only under conditions of unusual hardship.

A student progresses toward the PhD in two stages:

1. Comprehensive written examinations are given during the third week of October. Students must take this exam no later than their third year.

   There are six exam areas:

   I.   Metaphysics and epistemology
   II. Ethics and political and social philosophy
   III. Aesthetics
   IV. Philosophy of language
   V.   Philosophy of logic, logic, and the philosophy of mathematics
   VI. Philosophy of science

   Area I is required. In addition, each student must elect to take two other exams (that is, two exams from II through VI). There is no general history exam, but it is understood that historical questions appear in each of the six designated areas.

2. By January 10 following the October in which a student successfully completes the comprehensive examination, he must present a prospectus for a dissertation to his thesis committee. The committee then meets with the student to discuss and evaluate the proposal. Only as the outcome of such a meeting can the prospectus be approved. Approval of the prospectus is a requirement for admission to candidacy. A member of the committee is named to supervise the writing of the dissertation. Upon completion of his dissertation the candidate must defend it in a final oral examination.

In addition to the foregoing, each student must pass an examination in elementary logic, to be taken at the beginning of the first year.

The language requirement for each student is decided by a department committee of graduate faculty. The determination is based on a consideration of the area in which the student intends to specialize. In no case is proficiency in more than two languages required. In those areas where the primary sources are in English, a foreign language may not be required.

A detailed statement of the special department requirements for graduate students can be obtained from the Department of Philosophy, 1803 University Hall.

Courses for Graduate and Advanced Undergraduate Students

300. PHILOSOPHY OF SPACE AND TIME. 4 HOURS. Topics include geometry and space, contingent and necessary properties of space and time, the direction and flow of time, effects preceding their causes, and Zeno's paradoxes. Prerequisite: Two courses in philosophy or junior standing.

301. PLATO. 4 HOURS. May be repeated once for credit with the approval of the department. Careful reading of selected dialogues; emphasis on Plato's metaphysics and epistemology. Prerequisite: Two courses in philosophy or junior standing.

302. ARISTOTLE. 4 HOURS. May be repeated once for credit with the approval of the department. Careful reading of selected works; emphasis on Aristotle's metaphysics and epistemology. Prerequisite: Two courses in philosophy or junior standing.

303. CHINESE PHILOSOPHY. 4 HOURS. Development of major philosophies. Prerequisite: Two courses in philosophy.

304. SEVENTEENTH-CENTURY RATIONALISM. 4 HOURS. May be repeated once for credit with the approval of the department. Same as Religious Studies 304. Careful readings of the works of one or more of the rationalist philosophers, such as Descartes, Spinoza, and Leibniz. Prerequisite: Two courses in philosophy or junior standing.

306. BRITISH EMPIRICISM. 4 HOURS. May be repeated for credit with the approval of the department. Careful reading of the works of one or more of the British Empiricists, such as Locke, Berkeley, and Hume. Prerequisite: Two courses in philosophy or junior standing.

308. KANT. 4 HOURS. Intensive study of Kant's metaphysics and theory of knowledge with the main readings drawn from the *Critique of Pure Reason.* Prerequisite: Two courses in philosophy or junior standing.

309.   TOPICS IN THE HISTORY OF ETHICS. 4 HOURS. In-depth study of one person, such as Kant or Sidgewick, or one school of thought, such as the natural rights theorists or the utilitarians. Prerequisite: Phil 218.

310.   NINETEENTH-CENTURY AND EARLY TWENTIETH-CENTURY THOUGHT. 4 HOURS. May be repeated once for credit with the approval of the department. Readings in the works of Hegel, Schelling, Fichte, Schopenhauer, Marx and Engels, J.S. Mill, Nietzsche, McTaggart, Green, Bradley, Peirce, Perry, and others. Prerequisite: Two courses in philosophy or junior standing.

311.   INDUCTIVE LOGIC. 4 HOURS. Traditional and contemporary problems of induction. Inductive logic and the theory of probability. Prerequisite: Phil 211.

312.   RECENT AND CONTEMPORARY PHILOSOPHY: ANALYSIS AND LOGICAL EMPIRICISM. 4 HOURS. Developments in recent philosophy that have their roots in the study of logic and language, such as logical atomism, positivism, and analytical philosophy. Prerequisite: Two courses in philosophy or junior standing.

314.   RECENT AND CONTEMPORARY PHILOSOPHY: PHENOMENOLOGY AND EXISTENTIAL PHILOSOPHY. 4 HOURS. Important contributions to the phenomenological movement. Selected readings from Husserl, Heidegger, Jaspers, Sartre, Merleau-Ponty, and others. Prerequisite: Two courses in philosophy or junior standing.

315.   MODERN CHINESE PHILOSOPHY. 4 HOURS. Development of recent Chinese systems of philosophy. Prerequisite: Phil 303.

321.   INTRODUCTION TO FORMAL LOGIC. 4 HOURS. Semantics of first order logic with identity; other topics in mathematical or philosophical logic. Prerequisite: Phil 211.

322.   PROBLEMS IN THE FOUNDATIONS OF LOGIC AND MATHEMATICS. 4 HOURS. Survey of selected problems. Prerequisite: Phil 211 or the equivalent.

330.   TOPICS IN THEORY OF KNOWLEDGE. 4 HOURS. Intensive treatment of one or more topics, such as the analysis of empirical knowledge claims, the nature of truth, knowledge of other minds, the nature of necessary truths. Prerequisite: Phil 320.

332.   TOPICS IN ETHICS AND VALUE THEORY. 4 HOURS. Same as Religious Studies 332. Intensive treatment of one or more topics, such as the analysis of moral judgments, the classification of ethical theories according to their formal properties, the thesis of ethical relativism, and the comparison between ethical and scientific theories. Prerequisite: Phil 218 or two courses in philosophy one of which must be a 200-level course.

334.   AESTHETICS. 4 HOURS. Intensive examination of such topics as the aesthetic object, form in art, representation, meaning in art, art and knowledge. Prerequisite: Two courses in philosophy or junior standing.

336.   TOPICS IN METAPHYSICS. 4 HOURS. Intensive treatment of one or more topics, such as substance and attribute, universals and particulars, free will, human action, the relation between mind and body. Prerequisite: Phil 236.

338.   PHILOSOPHICAL ANALYSIS OF THE CONCEPT OF MIND. 4 HOURS. Intensive treatment of one or more topics in the philosophy of mind, such as

emotions, thoughts, intentions, and the will. Prerequisite: Two courses in philosophy or junior standing.

340. TOPICS IN THE PHILOSOPHY OF LANGUAGE. 4 HOURS. Intensive treatment of one or more topics, such as meaning, reference, and the structure of language. Prerequisites: Phil 211, 240.

341. PHILOSOPHICAL PROBLEMS IN THE SOCIAL SCIENCES. 4 HOURS. Critical examination of some important philosophical problems in the foundations of the social sciences: general methodological problems or specific philosophical problems arising from some specific theories, such as decision theory, theory of learning, information theory, or other theories. Exact content varies from year to year. Prerequisite: Two courses in philosophy.

343. FORMAL LOGIC I. 4 HOURS. Same as Mathematics 343. Propositional logic, logic of quantifiers, and identity and completeness. Prerequisite: Consent of the instructor; none for mathematics majors.

344. FORMAL LOGIC II. 4 HOURS. Same as Mathematics 344. Continues Philosophy 343. Mathematical analysis of decidability and computability. Arithmetization of syntax. Incompleteness and undefinability theorems. Introduction to axiomatic set theory. Prerequisite: Phil 343.

345. PHILOSOPHICAL PROBLEMS OF THE SCIENCES. 4 HOURS. May be repeated for credit with the approval of the department. Reading and discussion of selected works on the aims and methods of science, the status of scientific theories, natural laws and theoretical entities, and the nature of explanation. Prerequisite: Two courses in philosophy or junior standing.

347. PHILOSOPHY OF LAW. 4 HOURS. Intensive treatment of one or more topics, such as systems of criminal and civil laws, distinction between legislation and judicial decision-making, moral sources, justification of statutes and decisions, criminal and civil responsibility, *mens rea,* theories of punishment, civil disobedience, human rights and civil rights, civil liberties. Prerequisite: Two courses in philosophy or junior standing.

351. PROBLEMS IN THE PHILOSOPHY OF MATHEMATICS. 4 HOURS. Intensive study of a particular problem or nexus of problems. The problems vary from quarter to quarter. Prerequisite: Phil 298.

398. SENIOR SEMINAR. 4 HOURS. Individual research projects are reported to the seminar. Students who intend to do graduate work in philosophy are expected to take this course. Prerequisites: Senior standing, Phil 201, 203, 211, and at least one 300-level course.

399. INDEPENDENT STUDY. 1 TO 8 HOURS. Independent study, under the supervision of a staff member, of a topic not covered in the regular curriculum. The course is offered at the request of the student and only at the discretion of the staff members concerned. Prerequisite: Approval of the department.

Courses for Graduate Students

401. SEMINAR: TOPICS IN ANCIENT PHILOSOPHY. 6 HOURS. May be repeated once for credit with the approval of the department. Two sections may be taken concurrently when topics vary. Intensive study of selected topics.

403. SEMINAR ON MEDIEVAL PHILOSOPHY. 6 HOURS. May be repeated once for credit with the approval of the department. Two sections may be taken concurrently when topics vary. Persistent problems in the philosophy of the Middle Ages.

405. SEMINAR: TOPICS IN MODERN PHILOSOPHY. 6 HOURS. May be repeated once for credit with the approval of the department. Two sections may be taken concurrently when topics vary. Intensive analysis of the work of one important philosopher or philosophical movement between 1600 and 1900.

407. SEMINAR: TOPICS IN CONTEMPORARY PHILOSOPHY. 6 HOURS. May be repeated once for credit with the approval of the department. Two sections may be taken concurrently when topics vary. Intensive analysis of the work of one important philosopher or philosophical movement of the twentieth century.

411. SEMINAR ON RECENT ETHICAL THEORY. 6 HOURS. May be repeated once for credit with the approval of the department. Two sections may be taken concurrently when topics vary. Intensive study of selected topics.

413. SEMINAR ON PHILOSOPHICAL TOPICS IN LOGIC. 6 HOURS. May be repeated once for credit with the consent of the instructor. Two sections may be taken concurrently when topics vary.

415. SEMINAR ON METAPHYSICS. 6 HOURS. May be repeated once for credit with the approval of the department. Two sections may be taken concurrently when topics vary. Intensive study of selected topics.

417. SEMINAR ON THE PHILOSOPHY OF SCIENCE. 6 HOURS. May be repeated once for credit with the approval of the department. Two sections may be taken concurrently when topics vary. Intensive study of selected topics.

419. SEMINAR ON THE PHILOSOPHY OF LANGUAGE. 6 HOURS. May be repeated once for credit with the approval of the department. Two sections may be taken concurrently when topics vary. Intensive study of selected topics.

421. SEMINAR ON THE THEORY OF KNOWLEDGE. 6 HOURS. May be repeated once for credit with the approval of the department. Two sections may be taken concurrently when topics vary. Selected topics in the contemporary theory of knowledge.

423. SEMINAR ON AESTHETICS. 6 HOURS. May be repeated once for credit with the approval of the department. Two sections may be taken concurrently when topics vary. Intensive study of selected topics.

460. RECURSION THEORY I. 4 HOURS. Same as Mathematics 460. Introduction to the theory of recursive functions, Turing machines, and effective computability. Godel's incompleteness theorem. Prerequisite: Phil 344.

461. RECURSION THEORY II. 4 HOURS. Same as Mathematics 461. Classification of recursively enumerable sets, Post's problem, degrees of unsolvability, the arithmetical hierarchy. Prerequisite: Phil 460.

462. METAMATHEMATICS I. 4 HOURS. Same as Mathematics 462. Classical first order logic, axiomatic theories, model theory. Prerequisite: Phil 344.

463. METAMATHEMATICS II. 4 HOURS. Same as Mathematics 463. Incompleteness, undecidability, nondefinability. Prerequisite: Phil 462.

464.   METAMATHEMATICS III. 4 HOURS. Same as Mathematics 464. Higher order logic, infinitary logic, proof theory. Prerequisite: Phil 463.

465.   ADVANCED SET THEORY I. 4 HOURS. Same as Mathematics 465. Axiomatic set theory, consistency of the continuum hypothesis, and the axiom of choice. Prerequisite: Consent of the instructor.

466.   ADVANCED SET THEORY II. 4 HOURS. Same as Mathematics 466. Strong infinity axioms. Independence of the continuum hypothesis and the axiom of choice from Zermelo-Fraenkel's axioms. Prerequisite: Phil 465.

469.   ADVANCED TOPICS IN MATHEMATICAL LOGIC. 4 HOURS. May be repeated for credit. Same as Mathematics 469. Special topics. Prerequisite: Phil 344.

479.   SEMINAR: THEORETICAL, HISTORICAL, AND PHILOSOPHICAL ISSUES IN PSYCHOLOGY. 2 HOURS. Same as History 479 and Psychology 479. May be repeated. Systematic review of special topics; emphasis on current approaches and interpretations. Prerequisite: Consent of the instructor.

483.   INDEPENDENT STUDY. 2 TO 8 HOURS. Topics and plan of study must be approved by the candidate's adviser and by the staff member who directs the work.

490.   SEMINAR ON THE TEACHING OF PHILOSOPHY. 1 HOUR. May be repeated for credit. Discussion of problems connected with the teaching of introductory courses in philosophy. Required of all graduate students in philosophy unless excused by the department. All teaching assistants are required to enroll during the tenure of their assistantships.

499.   THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit.

PHYSICS

Professors: Swaminatha Sundaram, Head of the Department; Seymour Bernstein, Arnold R. Bodmer, James W. Garland, James S. Kouvel, Edward B. McNeil, Antonio Pagnamenta, R. Curtis Retherford, Ram R. Sharma, David J. Vezzetti, Herman B. Weissman, Lester Winsberg

Associate Professors: Stanley Aks, Richard A. Carhart, Helmut Claus, Alan S. Edelstein, Howard S. Goldberg, Gloria A. Hoff, Stephen J. Krieger, Arthur L. Licht, Donald W. McLeod, Seymour Margulies, William J. Otting, John N. Pappademos, David S. Schreiber, Julius Solomon

Assistant Professors: Larry L. Abels, Robert J. Abrams, Jack A. Kaeck, Ben Varga

The department offers work leading to the Master of Science and the Doctor of Philosophy with the following areas of specialization:

Atomic and Molecular Physics—oscillator strengths, vibrational and rotational spectra, high temperature properties, lasers, vacuum UV, astrophysics.

High Energy Physics—K^o decays, CP violation, scattering, weak and strong interactions, resonances, symmetries, field theory, Regge poles.

Nuclear Physics—nuclear structure, hypernuclei, nuclear potentials, deformed nuclei.

Solid State Physics—magnetic resonance and static susceptibility, specific heat, electron tunneling and transport properties of metals, superconductors, and insulators; studies at ultra-low temperatures; optical and dielectric properties.

Theoretical Physics—atomic-molecular energies; superconductivity, dispersion relations, lattice properties, electronophonon interactions, crystal fields, quantum hydrodynamics; nuclear structure and hypernuclei; field theory, particle interactions, resonances and scattering; statistical mechanics, astrophysics.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university, a grade point average of at least 3.75 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study, and at least 30 quarter hours of courses in physics beyond the level of general physics, including Physics 301, 302, 321, and 341 or their equivalents. In exceptional cases, students who have averages of less than 3.75 but above 3.50 or who have majored in fields other than physics may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Such students will be required to take the necessary undergraduate courses without credit in order to prepare themselves for successful participation in the program.

Each student is assigned a department adviser who assists in selecting an appropriate program of course work and insuring that all degree requirements are met. Upon entrance and before registering for the first time, each student takes the department placement examination. This examination, covering physics at the junior-senior level, assists the department in placing the student in courses at the appropriate level.

Degree Requirements

Master of Science

The general requirement for the Master of Science is satisfactory completion of a minimum of 48 quarter hours of course work in courses approved by the department. Each master's candidate must show proficiency in mechanics, electromagnetic theory, quantum mechanics, and thermal physics at the level of Physics 343, 303, 322, and 362, which are described in this bulletin. Such proficiency may be demonstrated either by a satisfactory grade on the placement examination or by satisfactory grades in the above courses. The 48 hours must include Physics 411, 412, and 413 and two sequences of courses from a list of sequences approved by the department. These sequences are designed to give the student a strong background in an area of physics in which there are professional opportunities for holders of the degree, e.g., solid state physics, physics teaching, optical physics, atomic-molecular physics.

For students who intend to continue to the PhD, the requirement of two sequences does not apply. These students must include in their program of study Physics 401, 402, 411, 412, 413, and 441.

In either case, a thesis is optional and, if elected, may be counted up to 12 hours. No more than 12 hours of Physics 497 may be counted toward the degree.

Doctor of Philosophy

The minimum requirements for the PhD are: (1) satisfactory completion of 144 quarter hours of course work approved by the department; including Physics 411, 412, 413, 414, 401, 402, 403, 441, and 461; at least 80 of these hours must be in courses other than Physics 499; (2) a satisfactory preliminary examination on course work at the senior and first-year graduate level (this examination is taken before the completion of two full years of course work and may be repeated once); (3) a satisfactory examination in the student's major area (this examination is taken after completion of a substantial fraction of the course work while the student is in the early stages of thesis research); (4) a satisfactory examination on the student's dissertation. Details concerning all examinations may be obtained from the department office.

Courses for Graduate and Advanced Undergraduate Students

301. ELECTRICITY AND MAGNETISM I. 4 HOURS. Credit is not given to graduate physics majors. Vector calculus; electrostatic potential and fields in vacuum and material media; energy concepts; boundary value problems. Prerequisites: Phys 114, Math 321.

302. ELECTRICITY AND MAGNETISM II. 4 HOURS. Credit is not given to graduate physics majors. Magnetostatics; vector potential; magnetic materials; time-varying fields and electromagnetic induction; Maxwell's equations. Prerequisite: Phys 301.

303. ELECTRICITY AND MAGNETISM III. 4 HOURS. Propagation of electromagnetic waves; reflection, refraction, and dispersion; guided waves; radiation; selected topics. Prerequisite: Phys 302.

304. ELECTRONICS I. 4 HOURS. Theory of electronic devices, linear and nonlinear analysis, applications of vacuum and semiconductor devices to circuits, amplifiers, biasing, feedback, oscillators, and special circuits. Prerequisite: Phys 301. Physics 302 and 303 are recommended.

305. ELECTRONICS II. 4 HOURS. Pulse-shaping networks, logic circuits, control circuits, distributed amplifiers, special problems of transducers, special signal-to-noise techniques. Prerequisite: Phys 304.

321. QUANTUM MECHANICS I. 4 HOURS. The basic theory of the mechanics governing microscopic systems. Wave functions; probability density; operators; the Schrodinger equation with examples in one and three dimensions. Prerequisites: Phys 114, 221 or approval of the department, Math 220. Credit or registration in Mathematics 310 is recommended.

322.   QUANTUM MECHANICS II. 4 HOURS. Mathematical structure of quantum mechanics; observables for a quantum state; angular momentum; perturbation theory; the Born approximation; the variational method; transition probabilities. Prerequisite: Phys 321. Credit or registration in Mathematics 311 is recommended.

323.   ELEMENTARY SOLID STATE PHYSICS. 4 HOURS. Crystal structure, thermal and dielectric properties of solids, free electron mode of metals, band theory, semiconductor physics, dislocations and strength of solids. Individual projects are required. Prerequisite: Phys 322.

331.   NUCLEAR PHYSICS. 4 HOURS. Natural and artificial radioactivity, equipment for studying and producing high-energy particles, nuclear disintegrations, interaction of nuclear particles with each other and with matter, cosmic rays, mesons, recent developments in high-energy physics. Individual projects are required. Prerequisite: Phys 321.

332.   INTRODUCTION TO PARTICLE PHYSICS. 4 HOURS. Properties of the known elementary particles and their basic interactions. Accelerators and detectors. The discrete conservation laws with applications. Antiparticles, strangeness. Prerequisites: Phys 321 and 322 or approval of the department.

341.   THEORETICAL MECHANICS I. 4 HOURS. Credit is not given to graduate physics majors. Motion of a particle in one, two, and three dimensions, Kepler's law and planetary motion, scattering of particles, conversion between laboratory and center of mass coordinate systems, conservation laws, motion of a rigid body in two dimensions. Individual projects are required. Prerequisites: Phys 114 or approval of the department. Math 220.

342.   THEORETICAL MECHANICS II. 4 HOURS. Statics of extended systems, moving coordinate frames, fictitious forces and conservation laws, special theory of relativity, mechanics of continuous media. Individual projects are required. Prerequisite: Phys 341.

343.   THEORETICAL MECHANICS III. 4 HOURS. Rigid-body motion in three dimensions, motion in gravitational fields, generalized coordinates and Lagrange and Hamilton equations, equations of constraint, small-vibration theory. Individual projects are required. Prerequisite: Phys 342.

361.   THERMODYNAMICS. 4 HOURS. Thermodynamics variables, equilibrium, zeroth law of thermodynamics, isolated systems, the first law, Kelvin and Clausius statements of second law, Clausius inequality, irreversible processes, thermodynamics potentials, Maxwell relations, stability criteria, equations of state, Clausius-Clapeyron equations, multicomponent systems, the third law, selected applications to physical systems. Prerequisite: Phys 114.

362.   STATISTICAL PHYSICS. 4 HOURS. Kinetic theory of dilute gases, elementary statistical concepts, equilibrium between interacting systems; temperature, entropy, statistical calculation of thermodynamic quantities, the microcanonical and canonical ensembles, quantum statistics of ideal gases, selected applications to physical systems. Prerequisite: Phys 361.

366.   INTRODUCTION TO THE MATHEMATICAL METHODS OF THEORETICAL PHYSICS I. 4 HOURS. Same as Mathematics 366. The traditional mathematical methods of theoretical physics from an intuitive point of view. Applications to

problem-solving in electrostatics and classical and quantum mechanics. Matrices and linear transformations, Fourier analysis, the partial differential equations of physics, and Sturm-Liouville theory. Introduction to special functions frequently encountered in physics. Prerequisites: Math 310, 321; Phys 303, 322, 342.

367.   INTRODUCTION TO THE MATHEMATICAL METHODS OF THEORETICAL PHYSICS II. 4 HOURS. Same as Mathematics 367. The traditional mathematical methods of theoretical physics from an intuitive point of view. Applications to problem-solving in electrostatics, electrodynamics, and classical and quantum mechanics. The special functions frequently encountered in physics and their use in the solution of boundary value problems, power series solutions, Green's functions, contour integral representations, and additional uses. Prerequisite: Phys 366.

368.   METHODS OF THEORETICAL PHYSICS. 4 HOURS. Practical calculations with Fourier transforms, residue calculus, dispersion relations. Applications of Legendre and Bessel functions. Integral equations. Prerequisite: Phys 367.

371.   LIGHT (WAVE OPTICS). 4 HOURS, LECTURE AND LABORATORY; 2 HOURS, LECTURE ONLY. Wave propagation and Maxwell's equations, interference and interferometers, gratings, circular aperture, echelon, resolving power. Prerequisites: Phys 114 and credit or registration in Math 220.

372.   LIGHT (MODERN OPTICS) I. 4 HOURS, LECTURE AND LABORATORY; 2 HOURS, LECTURE ONLY. Crystals, polarized light, optics of metals, quantum theory of radiation, transition probability and oscillator strength, dispersion and scattering theory. Prerequisite: Phys 371.

373.   LIGHT (MODERN OPTICS) II. 4 HOURS. Individual projects are required. Gaussian optics and general laws, special optical systems and applications. Image formation, finite image-error theory, spot diagrams. Necessary mathematical tools for Fourier analysis and transfer functions. Prerequisite: Phys 372.

381.   MODERN EXPERIMENTAL PHYSICS I. 4 HOURS; 1 HOUR, LECTURE ONLY. Techniques and experiments in the physics of atoms, atomic nuclei, molecules, the solid state, and other areas of modern physical research. Prerequisites: Phys 304, 331.

382.   MODERN EXPERIMENTAL PHYSICS II. 4 HOURS. Continues Physics 381. Lecture and laboratory. Prerequisite: Phys 381.

391.   PHYSICS SEMINAR. 1 TO 4 HOURS. Topics, to be arranged, cover recent developments in modern physics suitable for advanced undergraduate and graduate students. Prerequisites: Senior standing and approval of the department.

392.   PHYSICS RESEARCH. 2 TO 4 HOURS. Research under the close supervision of a faculty member. Prerequisites: Senior standing and approval of the department.

393.   SPECIAL PROBLEMS. 2 TO 4 HOURS. Special problems or reading in modern physics under individual arrangement with a faculty member. Prerequisites: Senior standing and consent of the instructor.

Courses for Graduate Students

401.   ELECTRODYNAMICS I. 4 HOURS. Maxwell's equations; static and time-dependent fields; boundary value problems; wave propagation. Prerequisite: Phys 303 or approval of the department.

402.   ELECTRODYNAMICS II. 4 HOURS. Classical theory of radiation; radiation reaction; special relativity; covariant formulation of electrodynamics. Prerequisite: Phys 401 or approval of the department.

403.   ELECTRODYNAMICS III. 4 HOURS. Lagrangian formulation of electrodynamics; action principles; special topics in electromagnetic theory. Prerequisite: Phys 402 or approval of the department.

411.   QUANTUM MECHANICS I. 4 HOURS. Wave functions, uncertainty principle and Schrodinger equation, one- and three-dimensional one-particle problems, approximate methods. Prerequisite: Phys 322 or approval of the department.

412.   QUANTUM MECHANICS II. 4 HOURS. Operators and Hilbert space formulation, symmetries and conservation laws, angular momentum and rotation, coupling of angular momenta, spherical tensors, scattering, phase shifts, Born series, scattering in Coulomb field, inelastic scattering. Prerequisite: Phys 411 or approval of the department.

413.   QUANTUM MECHANICS III. 4 HOURS. Introduction to formal theory of scattering, S-matrix, time-dependent and independent formulations of scattering, introduction to relativistic quantum mechanics, Klein-Gordon and Dirac equations, introduction to quantum field theory, electromagnetic transitions, particles and antiparticles. Prerequisite: Phys 412 or approval of the department.

414.   ADVANCED QUANTUM MECHANICS I. 4 HOURS. Canonical quantum field theory, quantization of the electromagnetic field, the Dirac field, the scalar and pseudoscalar meson fields, the interactions of quantum fields with classical fields. Prerequisite: Phys 413 or approval of the department.

415.   ADVANCED QUANTUM MECHANICS II. 4 HOURS. Interacting quantum fields, the S-matrix, the Dyson expansion and diagrams, applications to problems in quantum electrodynamics, renormalization and its physical interpretation. Prerequisite: Phys 414 or approval of the department.

417.   MANY-BODY THEORY I. 4 HOURS. Quantum theory of many-particle systems at zero temperature; molecular and self-consistent fields; canonical transformations; the quasiparticle; Green's functions; perturbation theory; Feynmann diagrams; simple applications to Fermi and Bose systems. Prerequisites: Phys 414, 461.

418.   MANY-BODY THEORY II. 4 HOURS. Functional integral formalism; elementary excitations and physical interpretation of Green's functions; Landau theory; thermal Green's functions and finite temperature perturbation theory; reaction matrix methods; applications to Fermi and Bose systems. Prerequisite: Phys 417.

421.   ATOMIC AND MOLECULAR PHYSICS I. 4 HOURS. Hydrogen atom and one-electron systems, helium atom, self-consistent field theory, alkali spectra, vector model, Zeeman and Stark effects, fine and hyperfine structure, collisions, ionization. Prerequisite: Phys 322 or approval of the department.

422.   ATOMIC AND MOLECULAR PHYSICS II. 4 HOURS. Rotation and vibrational energies of diatomic molecules, potential curves, electronic transitions and transition moments, intensities, thermodynamics properties, applications. Prerequisite: Phys 322 or approval of the department.

423.   ATOMIC AND MOECULAR PHYSICS III. 4 HOURS. Structure and symmetry of molecules, vibrational and rotational spectra, experimental infrared and Raman spectra, chemical bonding, molecular interactions, molecular collisions, intermolecular potentials, relaxation phenomena. Prerequisite: Phys 322 or approval of the department.

425.   SOLID STATE PHYSICS I. 4 HOURS. Crystal structure, X-ray methods, crystal forces, lattice theory, vibrations, heat conductivity. Prerequisite: Phys 323 or approval of the department.

426.   SOLID STATE PHYSICS II. 4 HOURS. Electric and magnetic properties of solids, free-electron model of metals, quantum statistics, band theory, order-disorder theory. Prerequisite: Phys 425 or approval of the department.

427.   SOLID STATE PHYSICS III. 4 HOURS. Semiconductors, ferromagnetism and antiferromagnetism, superconductivity, lattice vacancies, color centers, excitons, luminescence. Prerequisite: Phys 426 or approval of the department.

428.   QUANTUM THEORY OF SOLIDS I. 4 HOURS. Introduction to quantum mechanics of noninteracting particles in a periodic potential, band structure of solids, optical properties of solids, dynamics of electrons in a magnetic field and a crystal potential. Prerequisites: Phys 412, 427, and 461 or approval of the department.

429.   QUANTUM THEORY OF SOLIDS II. 4 HOURS. The electron-phonon interaction, collective excitations in solids, phonons, plasmons, polarons, magnons, excitons, quasiparticles, Landau theory of the Fermi liquid, the Hartree-Foch, RPA, and SCF approximations, generalized susceptibility, introduction to Green's functions, and diagrammatic techniques in solids. Prerequisite: Phys 428 or approval of the department.

430.   QUANTUM THEORY OF SOLIDS III. 4 HOURS. May be repeated for credit by arrangement with the department. Topics vary from year to year. Special topics in the modern theory of solids, superconductivity, ferromagnetism, liquid helium, theory of alloys, theory of liquids, theory of defects in semiconductors, applications of group theory to solid state physics, and others. Prerequisite: Phys 429 or approval of the department.

431.   ELEMENTARY PARTICLE AND NUCLEAR PHYSICS I. 4 HOURS. Two-nucleon system: properties of the deuteron, nucleon-nucleon scattering, nuclear forces. Properties of pions and pion-nucleon scattering, other nonstrange mesons; introduction to strange particles and higher symmetries. Prerequisite: Phys 412 or approval of the department.

432.   ELEMENTARY PARTICLE AND NUCLEAR PHYSICS II. 4 HOURS. General properties of nuclei: sizes, binding energies, stability, saturation. Introduction to nuclear models and structure. Beta decay and weak interactions. Prerequisite: Phys 431 or approval of the department.

433.   NUCLEAR PHYSICS I. 4 HOURS. Review of two-nucleon system and nuclear forces, nuclear models and nuclear spectroscopy. Individual-particle model, collective model, particle-hole excitations, pairing, electromagnetic interactions. Prerequisites: Phys 413 and 432 or approval of the department.

434. NUCLEAR PHYSICS II. 4 HOURS. Nuclear reactions: compound nucleus, optical model, direct reactions. Nuclear forces and nuclear structure; light nuclei, nuclear many-body problem; nucleon-nucleus scattering at high energies. Interactions of particles other than nucleons with nuclei. Prerequisite: Phys 433 or approval of the department.

435. ELEMENTARY PARTICLE PHYSICS I. 4 HOURS. Fields and invariance principles, relativistic kinematics and scattering, strong and electromagnetic interactions of nonstrange particles. Pions and nucleons, resonances, introduction to dispersion relations, one-particle exchangers, electromagnetic form factors. Prerequisites: Phys 413 and 432 or approval of the department.

436. ELEMENTARY PARTICLE PHYSICS II. 4 HOURS. Strong interactions of strange particles; higher symmetries; weak interactions of nonstrange and of strange particles. Prerequisite: Phys 435 or approval of the department.

437. SELECTED TOPICS IN ELEMENTARY PARTICLE PHYSICS. 4 HOURS. May be repeated for credit. Selected topics, including a systematic presentation of the available data and an exposition of the most relevant models of current interest.

441. CLASSICAL MECHANICS. 4 HOURS. Variational principles; Lagrange and Hamilton equations; Hamilton-Jacobi theory; rigid body motion; small oscillations; continuous systems and fields. Prerequisite: Phys 343 or approval of the department.

445. INTRODUCTION TO GENERAL RELATIVITY. 4 HOURS. Deficiencies of Newtonian gravitational theory, principle of equivalence, the metric field and geodesics, tensor analysis and differential geometry, Einstein's equations and the action principle, the energy-momentum pseudotensor, gravitational fields and waves. Prerequisites: Phys 402 and 441 or approval of the department.

451. PHYSICS TEACHING I. 4 HOURS. Seminars on various methods and approaches to classroom teaching at different college levels. Individual student design and construction of a classroom demonstration. Supervised practice teaching in the physics classroom. Prerequisite: Graduate standing or approval of the department.

452. PHYSICS TEACHING II. 4 HOURS. Seminars on methodology and problems associated with teaching college physics in the laboratory. Individual student design and construction of an experiment in introductory physics. Supervised practice teaching in the physics laboratory. Prerequisite: Phys 451 or approval of the department.

453. PHYSICS TEACHING III: CURRENT PRACTICES, PROBLEMS, AND TRENDS. 4 HOURS. Seminars on current practices and trends in teaching physics at the college and precollege levels. Lectures on educational problems in an urban environment, educational testing methods, modern teaching instruments, and other special topics. Prerequisite: Graduate standing or approval of the department.

461. STATISTICAL MECHANICS. 4 HOURS. Classical and quantum-statistical mechanics; Maxwell, Bose, and Fermi statistics; ensemble theory; imperfect gas; selected applications. Prerequisite: Phys 361 or approval of the department.

472. ASTROPHYSICS I: STRUCTURE, ENERGY SOURCES, AND EVOLUTION OF STARS. 4 HOURS. Observational characteristics of stars. Physical state of stellar interior: hydrostatic and thermal equilibrium, equation of state, energy transport.

Stellar atmospheres. Nuclear energy sources and nuclear reaction rates. Calculation of stellar structure; principal evolutionary phases. Prerequisites: Phys 322 and 362 or approval of the department.

473. ASTROPHYSICS II: STELLAR ATMOSPHERES AND INTERSTELLAR MEDIUM. 4 HOURS. Radiative transfer and spectra, physico-chemical processes in astrophysics, stellar atmospheres, gaseous nebulae, laboratory astrophysics studies, interstellar matter, planetary and space astronomy. Prerequisites: Phys 322 and 362 or approval of the department.

474. ASTROPHYSICS III: SELECTED TOPICS. 4 HOURS. May be repeated for credit. Seminar. Recent developments, especially in relativistic astrophysics, such as white dwarfs, neutron stars, gravitational collapse, quasars, topics in cosmology. Prerequisites: Phys 322 and 362 or approval of the department.

481. MATHEMATICAL METHODS OF PHYSICS I. 4 HOURS. Introduction to the linear methods of mathematical physics from the modern point of view. Mathematical foundations of quantum theory; classical problems of differential equations. Prerequisite: Approval of the department.

482. MATHEMATICAL METHODS OF PHYSICS II. 4 HOURS. Applications of linear analysis to ordinary and partial differential equations and integral equations. Properties of classical special functions and generalized functions. Prerequisite: Phys 481 or approval of the department.

491. GRADUATE SEMINAR I. 1 TO 2 HOURS. May be repeated for a total of 6 hours. Seminars in areas of research activity within the department covering recent contributions to the literature and research in progress. Presentations by students, faculty, and scientists from other institutions. Prerequisites: Phys 411, 412.

497. INDIVIDUAL STUDY. 2 TO 4 HOURS. Special topics. Outside reading and a term paper are assigned by special arrangement with the department and faculty. Prerequisite: Approval of the department.

498. SPECIAL TOPICS IN MODERN PHYSICS. 1 TO 4 HOURS. Students may enroll in more than one section concurrently. Lectures on topics of current interest. Subjects are announced. Prerequisites: Phys 411, 412.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Prerequisite: Approval of the department.

POLITICAL SCIENCE

Frank P. Scioli, Acting Head of the Department

Professors: Hollis W. Barber, Twiley W. Barker, Jr., Doris A. Graber, Richard M. Johnson, Boyd R. Keenan, Byung-Chul Koh, David C. Leege, Milton Rakove, Harry M. Scoble

Associate Professors: George D. Beam, Don R. Bowen, Thomas J. Cook, Eugene Eidenberg, Paul J. Hiniker (Visiting), Catherine Kelleher, Lyman A. Kellstedt, Frank P. Scioli, Dick W. Simpson, Frank Tachau

Assistant Professors: George I. Balch, Elinor R. Bowen, Anne M. Heinz, Peter R. Knauss, Lettie M. Wenner (Visiting), Laurie S. Wiseberg (Visiting)

The Department of Political Science offers work leading to the Master of Arts and, in cooperation with the University of Illinois at Urbana-Champaign, to the Doctor of Philosophy.

These programs emphasize contemporary urban problems, including the structure and processes of urban policy-making; public policy issues associated with environment and quality of life, racial and ethnic politics, and the politics of poverty; political change; political participation; and political allegiance and alienation. In the course of their training, students are expected to acquire both a theoretical perspective and the methodological tools necessary for the quantitative and nonquantitative analysis of political life.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study and must submit satisfactory scores on the Graduate Record Examination verbal and quantitative aptitude test and the advanced test in political science, three letters of recommendation, preferably from faculty members in political science or cognate disciplines who are familiar with the applicant's training and ability, and a statement of professional goals. In exceptional cases, students who have averages of less than 4.00 but above 3.75 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully.

Performance on the Graduate Record Examination, the undergraduate academic record, and the letters of recommendation are the three principal kinds of evidence considered in making decisions about admission and the awarding of assistantships. It is particularly advantageous, therefore, for the prospective applicant to take the Graduate Record Examination in the fall of the senior year.

Students are encouraged to begin their work in the fall quarter, though applications for admission in other quarters will be considered. Students who wish to be considered for teaching or research assistantships should apply as early as possible, preferably by March 1. Most appointments are announced by April 1.

Degree Requirements

Master of Arts

1. 48 quarter hours beyond the bachelor's degree for students electing the nonthesis option and 36 quarter hours (exclusive of thesis credit) for students electing to write a thesis. A maximum of two courses (8 quarter hours) may be taken outside the department.
2. Political Science 400—Power in Urban Areas: Introduction to Political Analysis (8 hours) or the equivalent.

3. A reading knowledge of French, German, Russian, or Spanish or demonstrated competence in statistics or another acceptable research tool.
4. Three quarters of residence, not necessarily consecutive, with 24 quarter hours taken in residence.
5. For the nonthesis option, at least 24 hours of course work at the 400 level. These students must also write an examination covering the area of specialization and other work taken during the MA program.
6. For the thesis option, a thesis, for which 12 hours of thesis research credit is awarded, and an oral examination thereon.

Doctor of Philosophy

The doctoral program is a joint cooperative program with the Department of Political Science at the Urbana-Champaign campus of the University of Illinois. It is limited to the fields of political analysis, public policy, and urban politics. Students wishing to specialize in other fields—for example, international relations, area studies—should seek admission to the PhD program at the University of Illinois at Urbana-Champaign.

Students at Chicago Circle can take most or all of their courses at Chicago Circle, but those who complete the program will receive a PhD from the Department of Political Science, University of Illinois at Urbana-Champaign. Students at Chicago Circle are encouraged to take some course work and/or do some research at Urbana-Champaign, and students in public policy and urban politics at Urbana-Champaign are also encouraged to make similar arrangements with the Chicago faculty. Both departments will make every endeavor to facilitate such arrangements.

The doctoral program is designed to train candidates for three types of careers. The teaching and research option is intended for those seeking to enter traditional academic life. In addition to training in research methodology and its application in dissertation research, the student serves as a teaching assistant and, under the close supervision of a faculty member, either assumes full responsibility for an introductory course or team teaches an advanced undergraduate course with a faculty member. Two research options are also offered, leading to careers in either basic or applied research. Candidates in the basic research option are trained by working on a project in collaboration with a faculty member or through closely supervised independent research. Candidates in the applied research option are trained through field experience and are assigned on a full-time basis to a government or political organization.

1. In addition to satisfying the general requirements of the Graduate College,* a student must complete 144 quarter hours of course work (including research) beyond the bachelor's degree or 96 quarter hours beyond the master's degree. Normally, this course work will include concentrations in two or three problem areas. Up to 24 hours in a minor field may also be included in a student's program if his doctoral committee approves.

*Courses taken at Urbana-Champaign count toward the residency requirement at Chicago Circle and vice versa for students enrolled in this joint PhD program.

2. Political Science 400—Power in Urban Areas: Introduction to Political Analysis (8 hours) or the equivalent.
3. A reading knowledge of French, German, Russian, or Spanish or demonstrated competence in statistics or another acceptable research tool.
4. Admission to candidacy. After one year of graduate work, students seeking a PhD should apply for admission to PhD candidacy. The Committee on Admission to Candidacy in the Urbana-Champaign department shall determine in all cases whether the applicant is qualified for candidacy using the same standards as are applied to its other applicants for a PhD. A member of the faculty at Chicago shall serve on the committee in an advisory ex officio capacity.
5. The preliminary examination. Normally, one quarter after completion of required course work and the teaching or research experience, the student is required to take a preliminary examination. This examination, consisting of both written and oral parts, tests the student's knowledge of the discipline generally and more particularly his understanding of political analysis and the various areas of concentration. These areas of concentration may derive from the political analysis sector or from problem foci. They may also involve a minor in a related discipline. Usually, a student will offer three areas of concentration, one of which will be the principal area.

    Prior to the oral portion of the examination, the student must submit to the committee a proposal for dissertation research. The oral examination will then involve a discussion of the proposed research and an inquiry into the student's understanding of the field and the student's capacity for a career in the discipline or his capacity to make significant contributions within the appropriate levels of a government or political organization.

    At least one of the members of the student's preliminary committee will be a member of the Urbana-Champaign department's faculty.
6. The dissertation. Each candidate for the doctorate must complete a dissertation for which the student receives 48 of the 144 credit hours required for the PhD. The general outline for dissertation research must be approved by the preliminary examination committee at the time of the oral examination. Details of the research design are subsequently approved by the dissertation committee. A research design is not approved unless the student has the requisite skills to complete the research project effectively.

    When the student and the committee agree that the dissertation is essentially complete, the student will be required to defend it orally before the committee.

    At least one member of the final examining committee is a member of the Urbana-Champaign department's faculty. The final version of the dissertation will reflect the recommendations and directives made by the committee following the oral defense.

Courses for Graduate and Advanced Undergraduate Students

305.   LOCAL POLITICAL DECISION-MAKING. 4 HOURS. A research seminar. The problem of identifying and investigating political decisions in a major urban area like Chicago; an attempt is made to apply different theories of decision-making to local politics. Prerequisites: PolS 120 or 150 and consent of the instructor.

306.   GHETTO POLITICS. 4 HOURS. Analysis of the political impact of the ghetto on local, state, and national political systems; the impotence of the ghetto voter; the ghetto politician; ghetto riots as political protest; the ghetto and presidential politics. Prerequisite: Three courses in political science, American history, or sociology.

307.   URBAN POLITICS SEMINAR. 4 HOURS. Analysis of the structure and dynamics of political parties and organizations in urban areas. Using Chicago and its suburbs as a laboratory, intensive study of the power structure, strength, and weakness of the Democratic and Republican parties in urban areas. Prerequisites: PolS 205 and consent of the instructor.

311.   STUDIES IN URBAN PUBLIC POLICIES. 4 HOURS. The problem of governing metropolitan areas; special emphasis on evolving patterns of cooperation among governments in metropolitian areas, such as metropolitan federalism, city-county consolidation, councils of governments, and regional planning commissions. Prerequisite: PolS 120 or 205.

315.   LEGISLATURES AND LEGISLATION. 4 HOURS. The legislative function in government; structure and organization of American national, state, and local legislatures; party organization in legislatures; legislative procedure; pressure groups and lobbying; relation of legislature to other branches of government; problem of legislative reorganization. Prerequisite: PolS 120 or 150 or 151.

316.   THE PRESIDENT AND CONGRESS. 4 HOURS. Analysis of the relationship of the President and Congress; problems involved in the formulation and execution of public policy. Prerequisite: PolS 120 or 150 or 151.

317.   INTERGOVERNMENTAL RELATIONS. 4 HOURS. The origin and evolution of the American federal system; federal-state constitutional relationships; inter-governmental fiscal relations; the political cultures; interstate relations; regional-ism; state-local relations, interlocal relations and cooperative federalism in functional areas. Prerequisites: PolS 150 or 151 and 205 or 212.

327.   PUBLIC OPINION AND POLITICAL COMMUNICATION. 4 HOURS. The nature of public opinion and political communication systems; patterns of opinion distribution and techniques for opinion measurement; forces shaping public opinion, with emphasis on the mass media; the impact of public opinion on public policy; comparison of political communication patterns in the United States with less developed and totalitarian nations. Prerequisites: PolS 100, 200.

328.   PROPAGANDA AND THE LANGUAGE OF POLITICS. 4 HOURS. The nature of propaganda, political symbols, and the language of politics; the uses of political symbols and propaganda in the political processes of democratic and totalitarian societies; international propaganda and psychological warfare; methods and uses of propaganda analysis. Prerequisites: PolS 100, 200.

331.   ELECTORAL BEHAVIOR. 4 HOURS. Emphasizes two aspects of the study of electoral behavior: social, economic, and psychological theories developed specifically for, or adaptable to, the explanation of electoral behavior; introduction to inductive studies of voting behavior. Prerequisites: PolS 100, 200. Political Science 220 is recommended.

332.   QUANTITATIVE STUDY OF MULTINATIONAL POLITICS. 4 HOURS. The usefulness of statistical reasoning in making inferences about international politics. Political decision-making, political conflict and cooperation, and political development and change in terms of three basic levels of analysis: multinational organization, nations, and international relations. Prerequisites: PolS 200, 230. Political Science 201 is recommended.

334.   POLITICAL SOCIALIZATION. 4 HOURS. Introduction to the problems of how people learn about the polity; from whom they learn, under what circumstances, and with what consequences. Prerequisite: Three courses in political science, including at least one dealing with human political behavior.

336.   FILM AS A RESEARCH TECHNOLOGY IN THE SOCIAL SCIENCES. 4 HOURS. The techniques and problems of film as a technology for generating, interpreting, and presenting data.

337.   THE POLITICS OF ALIENATION. 4 HOURS. Conceptual, empirical, and normative analysis of alienation from polity, society, culture, and self. Focus on the political consequences of various forms of alienation, including radicalism, apathy, protest, revolution, renewal, and innovation. Emprical research is required. Prerequisites: PolS 200, 220. Political Science 201 is recommended.

340.   THE POLITICS OF URBAN EDUCATION. 4 HOURS. Same as Education 306 and Urban Planning and Policy 306. Relations between school governance and urban politics. Particular attention to the role of educational interest groups, the school board, professional educators, citizens, and civic leaders in the formulation and execution of educational policy. Prerequisite: Consent of the instructor.

341.   POLITICAL CULTURE. 4 HOURS. Attitudes, values, beliefs, and behavioral norms that characterize the political system in the United States and other countries. Special problems, such as the nature of national identity, indicators of political cohesion, or determinants of political stability and instability, may be emphasized. Prerequisites: PolS 100, 200, 230.

353.   SEMINAR: PROBLEMS OF CONSTITUTIONAL LAW. 4 HOURS. Supervised individual study of selected problems arising in the interpretation of the United States Constitution. Prerequisites: PolS 200, either 253 or 254, and consent of the instructor.

356.   ADMINISTRATIVE LAW. 4 HOURS. Legal problems arising in the relationships between the citizen and the government official; administrative rule making and enforcement; judicial review of administrative actions. Prerequisite: Consent of the instructor.

361.   POLITICAL LEADERSHIP. 4 HOURS. Contemporary political leadership and elites. Various approaches to, and theories about, political leadership in a variety of situational contexts, such as small groups, developing nations, revolutionary societies, complex political systems and organizations. Prerequisites: PolS 101, 200, 230. Political Science 220 is recommended.

362.   SEMINAR: PUBLIC ADMINISTRATION. 4 HOURS. Supervised individual study of selected problems. Prerequisite: PolS 261 or 263.

364.   POLITICAL MODERNIZATION. 4 HOURS. The process of modernization in the United States and other countries; emphasis on the interaction between political and other factors, such as social change and economic growth; historical and contemporary patterns of political modernization and their problems. Prerequisites: PolS 200, 230.

370.   PRACTICUM IN TEACHING POLITICAL SCIENCE. 2 TO 8 HOURS. May be repeated for a maximum of 12 hours; no more than 6 hours may be applied toward the major in political science. A limited exposure for seniors and graduate students to teaching political science by leading discussion sections of undergraduate courses and participating in a seminar on the problems and methods of teaching in the field. Teaching assistants may not receive credit for this course unless they actually teach discussion sections and are enrolled in this seminar. Prerequisites: Senior or graduate major in political science, at least a B average in political science courses, and consent of the instructor.

381.   SEMINAR: POLITICAL PROBLEMS OF DEVELOPING SOCIETIES. 4 HOURS. May be repeated to a maximum of 12 hours if the subject matter is different for each registration. Same as Latin American Studies 381. Selected aspects of the politics of the countries of Asia, Africa, and Latin America. Prerequisites: PolS 100, 200, 232. Additional prerequisites may be stipulated depending on the subject matter of the seminar.

385.   WOMEN AND POLITICS: PROBLEMS IN POLICY ANALYSIS AND POLITICAL THEORY. 4 HOURS. The political, social, and economic participation of women in American society. Theories on the use of power, socialization, and psychobiology as models in analyzing the outputs and outcomes of policies that affect women. Prerequisites: PolS 200 and one other 200- or 300-level political science course. Political Science 220 is recommended.

386.   PROBLEMS IN INTERNATIONAL ORGANIZATION. 4 HOURS. May be repeated once for credit. Subject matter varies from quarter to quarter but centers upon one group of related problems pertaining to the United Nations or other international organizations. Prerequisites: PolS 200 and two courses in international politics or international organization. Political Science 184 and 286 are recommended.

388.   SEMINAR: PROBLEMS IN AMERICAN FOREIGN RELATIONS. 4 HOURS. Supervised individual study of selected problems of contemporary United States foreign relations. Prerequisites: PolS 200 and either 184 or 281. Political Science 202 is recommended.

390.   SCOPE AND METHODS OF POLITICAL SCIENCE. 4 HOURS. The scope and subject matter of political science. Special attention to analytic processes in the development of concepts, hypotheses, and theories. Methodologies and modes of analysis now in use by political scientists. Prerequisites: PolS 100, 120, or 151 and one 200-level course in political science.

391.   POLITICAL POWER. 4 HOURS. The problem of the nature of political power. Introduction to some of the major literature of power and the development of the concept of political power as a descriptive category adequate to the comparative analysis of broader political phenomena, such as parties, official decision-making structures, and movements. Prerequisites: PolS 120 or 150 and 4 hours of upper-division political science courses.

392. DEMOCRATIC THEORY. 4 HOURS. Democracy as a procedure of government and the value commitments associated with this form of government. Special attention to corporate wealth, special interests, bureaucracy, and the mass media as they affect the existence of democratic government.

395. POLITICAL VIOLENCE. 4 HOURS. Seminar. Analysis of the use, or threat, of violence in the political process. Attention is focused on domestic forms of violence and aggression in various nations viewed cross-culturally. Prerequisites: PolS 150 or 151, two 4-hour courses in the social sciences, and consent of the instructor.

398 THE PROBLEM OF JUSTICE. 4 HOURS. Same as Criminal Justice 398 and Religious Studies 398. The premodern view of justice, Plato's or Aristotle's; the modern understanding of justice, such as Hobbes' or Locke's, which is the foundation of the modern political regime; Rousseau's seminal political thought on justice, which is the basis for a variety of reforms and alternatives offered to Hobbes' and/or Locke's political regime. Prerequisite: Two courses in political science, including PolS 150 or 151.

399. SEMINAR ON POLITICAL THEORY. 4 HOURS. May be repeated for a total of 8 hours. In-depth analysis and discussion of selected problems or works in political theory. Prerequisites: PolS 200, 290, 291, 292.

Courses for Graduate Students

400. POWER IN URBAN AREAS: AN INTRODUCTION TO POLITICAL RESEARCH. 8 HOURS. Aspects of political analysis, including concept formation, explanation, and choice of research methods, applied to community power and other topics in urban politics. Emphasis on the ways in which urban politics and policies can be studied.

401. EXPERIENCING AND INTERPRETING POLITICS: THE USE OF LANGUAGE. 4 HOURS. Principles of concept formation in social science. Analysis of political words through ordinary language philosophy. Criteria of meaning, including the verification principle and logical positivism. The function of language in the study of politics. Prerequisite: PolS 400.

402. EXPERIENCING AND INTERPRETING POLITICS: THE USE OF LOGIC. 4 HOURS. Theorizing: inductive and deductive. Logics of discovery and verification. Research designs. Measurement principles; data generation. Selection of objects and subjects; sampling. Data reduction. Prerequisite: PolS 400.

403. EXPERIENCING AND INTERPRETING POLITICS: THE USES OF DATA. 4 HOURS. Data analysis; descriptive statistics, display correlation and regression; inductive statistics; interpretation. Evaluation of data for inference. Prerequisite: PolS 400. Political Science 402 is recommended.

408. GOVERNMENT AND POLITICS OF CHICAGO. 4 HOURS. The political process in Chicago, including an analysis of the city government and other governments, such as the Park and Sanitary districts. The role of the political parties, business and civic leaders, the press, and other factors involved in the governmental process. Prerequisite: PolS 205.

409. SUBURBAN GOVERNMENT AND POLITICS. 4 HOURS. Examination of government and politics in suburban America. Particular attention to party structure, financing of governmental units, and the patterns of political competition in the suburbs. Prerequisite: PolS 205.

420.   SPECIAL PROBLEMS IN URBAN GOVERNMENT. 4 HOURS. Intensive study of selected current problems. Maximum emphasis on an opportunity to undertake and report on independent research. Prerequisite: PolS 205.

421.   URBAN MANAGEMENT PROCESSES. 4 HOURS. The political and administrative aspects of managing the urban environment. The specific tasks that face such urban executives as mayors, city managers, and department heads. Prerequisite: PolS 212 or 317.

422.   SEMINAR ON POLITICS AND ADMINISTRATION. 4 HOURS. The interplay between politics and administration. The manner in which politics shapes and conditions public administration and vice versa. Both theoretical materials and empirical case studies are examined. Prerequisite: PolS 261.

423.   SPECIAL TOPICS IN PUBLIC ADMINISTRATION. 4 HOURS. Analysis of selected problems. Topics vary from year to year, depending upon the needs and interests of the students. Prerequisite: PolS 261.

424.   PROBLEMS IN STATE GOVERNMENT. 4 HOURS. Case analysis and research in selected problems dealing with the structure, functions, and administrative processes of American state governments. Prerequisite: PolS 317 or 362.

426.   SEMINAR ON LEGISLATION AND PUBLIC POLICY. 4 HOURS. Intensive study of the institutional and dynamic forces that affect public policy-making in the United States. Emphasis on the separation of powers and the role of pressure groups, public opinion, and organizational bureaucracies as they affect the decision-making process. Prerequisite: PolS 315 or 316.

446.   SEMINAR ON ENVIRONMENTAL POLICIES. 4 HOURS. Research seminar on methods by which policy makers affect the physical environment in the United States. Discussion of physical, administrative, attitudinal, economic, social, and political constraints on policy. Proposals for changes in policy are evaluated. A major research project on some aspect of environmental control is expected. Prerequisite: PolS 266.

462.   TOPICS IN POLITICAL COMMUNICATION. 4 HOURS. May be repeated for credit up to a maximum of 12 hours. Intensive study of selected aspects, such as urban political communications patterns, communication elites, mass media influence on electoral politics, and mass media influence on political images. Emphasis on independent research, using a variety of communication research techniques. Prerequisite: Consent of the instructor.

464.   TOPICS IN POLITICAL MODERNIZATION. 4 HOURS. The process of political modernization in various contexts, such as urban, community-group, state, national, American, and/or foreign, from such perspectives as structural-functional, historical, dynamic-processual. Implications for political ideas, structures, and behavior. Prerequisite: PolS 364.

481.   EVALUATION OF POLICY OUTCOMES. 4 HOURS. The procedures by which social science researchers investigate the impact of public policy on realization of objectives. The development of a measurement rationale for analyzing policy impact and the methodologies utilized in conducting the evaluation. Prerequisite: PolS 400.

482.   PROBLEMS IN AMERICAN CONSTITUTIONAL LAW. 4 HOURS. Research in selected problems evolving from conflicting interpretations of the United States Constitution. Prerequisite: PolS 351 or 355 or the equivalent.

484.   TOPICS IN PUBLIC POLICY ANALYSIS. 4 HOURS. A research seminar focusing on the student's development and execution of a research design for the analysis of a particular policy area. Prerequisite: PolS 481.

485.   SEMINAR ON ADMINISTRATIVE THEORY AND BEHAVIOR. 4 HOURS. Analysis of the theory of bureaucratic organization in several substantive areas. The nature and function of theory in administrative study; basic concepts, hypotheses, and research findings in organizational theory and behavior; leadership theory, decision-making; organizational authority; patterns of accommodation between the organization and its members. Prerequisite: PolS 261.

486.   SEMINAR: COMPARATIVE AND INTERNATIONAL ADMINISTRATION. 4 HOURS. Supervised individual study of selected problems. Prerequisite: PolS 263.

492.   GRADUATE FIELD EXPERIENCE IN POLITICAL SCIENCE. 2 TO 16 HOURS. The student is placed in an organization on a part-time to full-time basis. Possible placement sites include, but are not limited to, government agencies, political party organizations, community groups, and various types of private organizations. Arrangements are made with the organization by the department and the student for both placement and an acceptable research project. The student's project culminates in a major paper evaluated by the supervising faculty member. Prerequisites: PolS 400, one additional graduate research methods course, one course in public administration or organization theory, one course in urban politics, and consent of the instructor.

497.   DIRECTED READINGS IN POLITICAL SCIENCE. 4 HOURS. May be repeated for a maximum of 8 hours. Intensive readings on a topic not covered in the regular curriculum. Prerequisite: Consent of the instructor.

498.   INDEPENDENT RESEARCH IN POLTICAL SCIENCE. 2 TO 8 HOURS. May be repeated for a maximum of 8 hours. Research on special problems not included in the regular course offerings. The work undertaken for this course may not duplicate that being done for Political Science 499. Prerequisite: Consent of the instructor.

499.   THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Open only to degree candidates. Individual study and research required of all students pursuing the advanced degree in political science under the thesis option.

PSYCHOLOGY

Professors: Leonard D. Eron, Chairman of the Department; Philip Ash, Gershon B. Berkson, Rosalind D. Cartwright, John D. Davis, Roger L. Dominowski, Isadore E. Farber, Benjamin Kleinmuntz, Susan M. Markle, Theodore Millon, Sheldon Rosenberg, Harry S. Upshaw

Associate Professors: Philip E. Freedman, Charles L. Gruder, L. Rowell Huesmann, Ernest W. Kent, Leon K. Miller, Rolf Peterson, Alexander J. Rosen, Gerald Senf, Herbert H. Stenson, Judith V. Torney

Assistant Professors: Raymond Bennett, Alan Benton, Shari Diamond, Bruce A. Korth, Leonard P. Kroeker, Michael Levine, Steven Reiss, Maris Rodgon, Leonard W. Sushinksy

The department offers work leading to the Master of Arts and the Doctor of Philosophy.

Admission Requirements

Minimum department requirements are as follows:

A. A grade point average of 4.20 (A=5.00) for both of the last two years of undergraduate study and for all graduate work. A student whose average is between 4.20 and 4.00 may be considered on the basis of individual merit.

B. The equivalent of 24 quarter hours in psychology, including statistics and a laboratory course in experimental psychology, one year of college mathematics, and one year of laboratory courses in physical and/or biological sciences. Students with exceptionally high grade point averages and/or scores on the Graduate Record Examination who do not fulfill all course requirements may be admitted provisionally, pending satisfactory completion of the course requirements without graduate credit.

C. Satisfactory scores on the Graduate Record Examination aptitude test (verbal and quantitative) and the advanced test in psychology. Standards of acceptable performance on the advanced test may be modified for undergraduate majors in fields other than psychology if they are otherwise especially well qualified.

D. Satisfactory ratings by three faculty members, preferably psychologists, who are familiar with the applicant's training and ability. In the case of candidates who have been engaged in professional work for some years, ratings by supervisors may be substituted.

Graduate admissions are limited; therefore, it may not be possible to accept all applicants who meet the foregoing minimum requirements. Preference is given to candidates particularly well qualified in quantitative and experimental psychology and in the natural sciences.

Special consideration is given in admissions and in academic program planning to students who are judged especially likely to succeed even though they do not meet the admissions criteria. Minority-group members who may have experienced educational disadvantage are encouraged to apply under this provision.

Although applications may be accepted until the Graduate College deadline, students who expect to enter the department's program in the fall are advised to complete their applications by February 15. Completed application materials must include applications for admission and for graduate appointment, referees' ratings, official transcripts, and Graduate Record Examination scores.

Degree Requirements

The department offers work leading to the Master of Arts and the Doctor of Philosophy. The faculty of the department is organized into an undergraduate division and nine graduate divisions, corresponding to substantive and curricular interests. Six of the divisions correspond to broad, substantive areas: cognitive psychology, developmental psychology,

learning-motivation, methodology and measurement, physiological psychology, and social psychology. Three divisions cover the graduate curriculum of the department: the academic curriculum, the clinical curriculum (APA approved), and the organizational curriculum. Within these, specialties are available in industrial psychology, institutions of higher education, community systems, and school psychology. Course requirements have been established for each division. Students elect one substantive and one curricular division, which usually determine the program of study.

Master of Arts

A candidate must complete 48 quarter hours of graduate-level course work (including research) and present an acceptable thesis. At least 16 quarter hours must be in one of the six substantive divisions. This program will be established by the division. The candidate must also complete Psychology 343.

Doctor of Philosophy

A candidate must complete 144 quarter hours of graduate-level course work (including research). In addition, he must have completed a master's thesis or its equivalent and must pass preliminary examinations, demonstrate proficiency in special research skills, and present an acceptable dissertation. Courses offered in fulfillment of these requirements must include Psychology 343, 370, 443, 444, and the programs of one of the substantive divisions and one of the three curriculum divisions. The candidate must also complete at least two courses in each of two cognate areas. These courses and areas are specified by the substantive division.

By virtue of its urban setting and its proximity to a large number of academic, health, and community institutions, the department has training and research facilities throughout the Chicago area. Among them are the University of Illinois Medical School, the Neuropsychiatric Institute, the Institute of Juvenile Research, the Chicago and suburban public schools, the Cook County Sheriff's Office Court Services training facilities, and the Chicago Association for the Retarded.

Courses for Graduate and Advanced Undergraduate Students

312.   PERSON PERCEPTION. 4 HOURS. Analysis of theory and research on the perception and evaluation of persons in social settings, with emphasis on role theory, attribution, and social comparison processes. Applications to dynamics of interpersonal attraction, affiliation, and influence in experimental and natural settings. Prerequisite: Graduate standing or Psch 265 and consent of the instructor.

313.   SOCIAL JUDGMENT. 4 HOURS. Analysis of the judgment process and its implications for social-psychological phenomena. Prerequisite: Graduate standing or Psch 265 and consent of the instructor.

314.   ATTITUDE CHANGE. 4 HOURS. Critical analysis of selected contemporary theory and research. Topics include source and message effects, determinants of persistence of change and resistance to change. Prerequisite: Graduate standing or Psch 265 and consent of the instructor.

315. COGNITIVE CONSISTENCY PROCESSES. 4 HOURS. Critical analysis of research and theory related to the processes of information integration and its implications for attitude and opinion change. Emphasis on cognitive consistency formulations and their derivatives. Prerequisite: Graduate standing or Psch 265 and consent of the instructor.

316. ANIMAL BEHAVIOR. 4 HOURS. Principles and methods in the study of animal behavior; review of the social behavior of representative species in various phyla. Prerequisites: BioS 100, 101, 102, Psch 143.

323. PSYCHOLOGY OF THE EXCEPTIONAL CHILD. 4 HOURS. Methods, results, and interpretation of studies of physically, intellectually, and emotionally deviant children, with special reference to their implications for education and behavior modification. Prerequisite: 12 hours of psychology including Psch 220 or the equivalent.

330. ORGANIZATIONAL PSYCHOLOGY. 4 HOURS. Same as Management 330. Individual psychological and group processes and their interaction with organizational structure. Behavioral factors in effective organizational change. Prerequisite: Graduate standing or Psch 243, one course in social psychology or industrial psychology, and consent of the instructor.

332. PERSONNEL PSYCHOLOGY. 4 HOURS. Systematic study of the development and utilization of psychological techniques of personnel selection, classification, and assessment. Prerequisite: Graduate standing or Psch 240, 243, and consent of the instructor.

333. MOTIVATION AND MORALE IN ORGANIZATIONS. 4 HOURS. Same as Management 333. Concepts and methods in the assessment and modification of motivation, attitudes, and morale. Prerequisite: Graduate standing or 12 hours of psychology, including Psch 330, and consent of the instructor.

335. PSYCHOLOGY OF INDUSTRIAL TRAINING. 4 HOURS. Same as Management 335. Psychological measurement techniques in assessing training needs and evaluating training effectiveness. Application of psychological techniques to the development of industrial training programs. Prerequisite: Graduate standing or Psch 332 or the equivalent.

338. PSYCHOLOGY OF INDUSTRIAL CONFLICT. 4 HOURS. Same as Management 338. Behavioral analysis of the causes, dimensions, and modes of resolution of industrial conflict; special emphasis on labor-management relations. Prerequisite: Graduate standing or Psch 330 or the equivalent.

343. ADVANCED STATISTICS I. 4 HOURS. Elementary probability theory, empirical and theoretical distributions, points and interval estimation, hypotheses testing. Prerequisite: Graduate standing or Psch 243 and consent of the instructor.

345. PSYCHOMETRIC APPLICATIONS. 4 HOURS. Theory of psychological tests and measurement applied to problems of ability and personality testing; opinion sampling; reliability and validity; prediction and selection processes. Prerequisite: Graduate standing or Psch 243 and consent of the instructor.

350. LEARNING AND CONDITIONING. 4 HOURS. Methods, results, and interpretation of experimental studies of basic learning processes in animal and human subjects. Prerequisite: Graduate standing or Psch 261 and consent of the instructor.

351. PROGRAMMED LEARNING. 4 HOURS. Theory and research in the techniques, applications, and results of programmed instruction. Prerequisite: Graduate standing or Psch 224 and consent of the instructor.

352. MOTIVATION. 4 HOURS. Methods, results, and interpretation of experimental studies of basic motivational processes in animal and human subjects. Prerequisite: Graduate standing or Psch 261 or 266 and consent of the instructor.

353. OPERANT CONDITIONING. 4 HOURS. Survey of basic principles and current research in the area of operant behavior. Prerequisite: Graduate standing or consent of the instructor.

354. THE PSYCHOLOGY OF LANGUAGE. 4 HOURS. Same as Linguistics 374 and Speech and Theater 354. Introductory survey of methods, theory, and research; the history and present status of psychology's interest in language behavior. Prerequisite: Consent of the instructor.

355. HIGHER PROCESSES. 4 HOURS. Methods, results, and interpretations of experimental studies of language behavior, problem-solving, concept formation, and creativity. Prerequisite: Graduate standing or consent of the instructor.

356. SENSORY AND PERCEPTUAL PROCESSES I. 4 HOURS. Methods, results, and interpretation of experimental studies dealing with the determination of psycho-physical functions. Primary emphasis on the perception of single discrete stimuli and attributes of stimuli. Prerequisite: Graduate standing or Psch 250 and consent of the instructor.

357. SENSORY AND PERCEPTUAL PROCESSES II. 4 HOURS. Methods, results, and interpretation of experimental studies dealing primarily with the role of contextual and experimental factors in perception. Prerequisite: Graduate standing or Psch 250 and consent of the instructor.

360. HUMAN FACTORS. 4 HOURS. Application of experimentally derived principles of behavior to the design of equipment for efficient use and operation. Sensory and perceptual processes, motor skills, and experimental methodology. Prerequisite: Graduate standing or 12 hours of psychology, including Psch 250 and 251 or the equivalents.

361. INSTRUMENTATION IN PSYCHOLOGY. 4 HOURS. Use of transducers, programming equipment, and recording systems in psychological research. Prerequisite: Graduate standing or consent of the instructor.

362. PHYSIOLOGICAL PSYCHOLOGY. 4 HOURS. Methods, results, and interpretation of experimental studies of physiological and neurochemical correlates of learning, motivation, and perception. Laboratory demonstrations and problems. Prerequisite: Graduate standing or 12 hours of psychology, including Psch 256 or the equivalent, and consent of the instructor.

363. BEHAVIORAL PHARMACOLOGY. 4 HOURS. Methods, results, and interpretation of experimental studies dealing with drugs and behavior. The role of drugs as tools in behavioral research and the use of experimental psychology techniques to explicate drug action. Prerequisite: Graduate standing or Psch 251, 256, and consent of the instructor.

370. SYSTEMS AND THEORIES. 4 HOURS. Critical introductory analysis of major historical systems and their representation in current theoretical issues. Prerequisite: Graduate standing or Psch 250, 251, and consent of the instructor.

382.   INTRODUCTION TO CLINICAL PSYCHOLOGY. 4 HOURS. The major areas, including assessment, treatment, and consultation, are considered in terms of current theory, practice, and research. Practicum work in a clinical endeavor, such as intellectual appraisal of children or organizational diagnosis of an elementary schoool, supplements classroom activity. Prerequisites: Psch 243 or 240 and consent of the instructor.

399.   PROBLEMS IN PSYCHOLOGY. 2 TO 12 HOURS. May be repeated for a total of 12 hours. Investigation of special problems under the direction of a staff member. Prerequisite: Consent of the instructor and of the chairman of the department.

Courses for Graduate Students

Note: The prerequisites stated apply to graduate majors in psychology. Students minoring in psychology or majoring in related fields may, with the consent of the instructor, enroll in certain courses without having met all prerequisites.

400.   MEMORY. 4 HOURS. Comparison of theoretical formulations and evaluation of research findings on human learning and retention.

401.   EXPERIMENTAL PSYCHOLINGUISTICS. 4 HOURS. Same as Linguistics 471 and Speech and Theater 401. Intensive review of experimental laboratory studies concerned with the effects of phonological, syntactic, and semantic variables on sentence perception, comprehension, production, and memory in the mature user of language. The relevance of the research in contemporary psycholinguistic theory is emphasized. Prerequisites: Psch 354 or the equivalent and consent of the instructor.

408.   INSTRUCTIONAL PSYCHOLOGY. 4 HOURS. Psychological analysis of complex subject matter and the process of instruction; emphasis on the acquisition of structured knowledge.

409.   SEMINAR ON COGNITIVE PSYCHOLOGY. 4 HOURS. May be repeated. Systematic review of special topics; emphasis on current research and theoretical developments. Prerequisite: Consent of the instructor.

410.   EXPERIMENTAL APPROACHES TO PERSONALITY. 4 HOURS. Analysis of empirical and theoretical advances in experimental research in personality. Emphasis on the interaction of experimental factors in learning, motivation, and cognition with individual differences variables. Prerequisite: Consent of the instructor.

411.   SMALL GROUPS: STRUCTURE AND PROCESS. 4 HOURS. Same as Sociology 411. Systematic survey of research and theory dealing with social interaction and social relationships in small groups; primary groups as agents of social influence and social control. Prerequisite: Consent of the instructor.

412.   RESEARCH METHODS IN SOCIAL PSYCHOLOGY. 4 HOURS. Principles of design, data collection, and analysis of social-psychological research in the laboratory and in naturalistic settings. Prerequisite: Psch 444.

416.   THEORIES OF SOCIAL BEHAVIOR. 4 HOURS. Current theoretical formulations and relevant data concerning major aspects of social behavior. Prerequisite: Psch 310 or the equivalent.

419. SEMINAR ON SOCIAL PSYCHOLOGY. 2 HOURS. May be repeated for credit. Critical discussion of selected topics, such as social judgment, group processes, attitude formation and change. Content varies. Prerequisites: Relevant 300-level or 400-level courses in social psychology and consent of the instructor.

420. ADVANCED DEVELOPMENTAL PSYCHOLOGY. 4 HOURS. Theory and research on psychological development through adolescence; physical, mental, and social growth. Prerequisites: Psch 220 or the equivalent and consent of the instructor.

421. DEVELOPMENTAL PSYCHOBIOLOGY. 4 HOURS. Review of theories of behavioral development from a biological orientation. Prerequisites: Psch 420 and consent of the instructor.

422. COGNITIVE DEVELOPMENT. 4 HOURS. A review of contemporary theory and research in intellectual development from birth to young adulthood. Prerequisite: Psch 420.

423. PERCEPTUAL DEVELOPMENT. 4 HOURS. Contemporary theory and research in the assessment and development of perceptual capacities in children. Prerequisites: Psch 357 and 420.

424. SOCIAL DEVELOPMENT. 4 HOURS. Discussion at an advanced level of processes and substantive areas of social development; major stress on social learning theory, socialization, dependency, identification, and cognitive-developmental processes as they influence social development. Participation in a small research or interview project is required. Prerequisite: Psch 420.

425. PRACTICUM IN DEVELOPMENTAL PSYCHOLOGY. 2 HOURS. May be repeated. Supervised practice in the observation and assessment of behavior development in natural settings, including preschool, grade school, and special treatment units. Normal and exceptional children and adolescents. Prerequisites: Psch 420 or the equivalent and consent of the instructor.

427. DEVELOPMENTAL PSYCHOLINGUISTICS. 4 HOURS. Same as Linguistics 472. Theoretical formulation, research methods, and research findings in the areas of language development. Biological foundations and environmental influences; disorders of language development. Prerequisites: Psch 354 or the equivalent and consent of the instructor.

429. SEMINAR ON DEVELOPMENTAL PSYCHOLOGY. 2 HOURS. May be repeated. Systematic review of special topics; emphasis on current research. Prerequisites: Psch 420 or the equivalent and consent of the instructor.

430. CONTEMPORARY THEORIES OF PSYCHOTHERAPY. 4 HOURS. Basic principles, practices, and theories of counseling. Prerequisite: Consent of the instructor.

431. ORGANIZATIONAL PSYCHOLOGY OF COMMUNITY SYSTEMS I. 4 HOURS. Examination of various agencies in the Chicago metropolitan area, such as prisons and community mental health and senior citizen centers, through on-site observations, reading, and seminar participation. Organizational processes as they operate in community settings. Prerequisite: Consent of the instructor.

432. ORGANIZATIONAL PSYCHOLOGY OF COMMUNITY SYSTEMS II. 4 HOURS. Examination of various agencies in the Chicago metropolitan area, such

as prisons and community mental health and senior citizen centers, through on-site observations, reading, and seminar participation. Students have direct experience with organizational processes as they operate in community settings through an apprenticeship. Prerequisite: Psch 431, consent of the instructor.

434. PRACTICUM IN ORGANIZATIONAL PSYCHOLOGY. 2 TO 4 HOURS. May be repeated. Supervised practicum in organizational settings, including industry and educational institutions. Prerequisite: Psch 330.

435. PRACTICUM IN PSYCHOTHERAPY. 4 HOURS. May be repeated. Supervised practice in a counseling or clinical setting. Application of basic principles; special emphasis on the problems of the culturally disadvantaged. Prerequisites: Psch 430 and consent of the instructor.

436. PERSONNEL MEASUREMENT TECHNIQUES IN INDUSTRY. 4 HOURS. Development, analysis, and use of tests in the selection, classification, and performance evaluation of industrial personnel. Practice in the development and validation of industrial classification and selection of test batteries. Prerequisites: Psch 332 or the equivalent and Psch 345.

438. SEMINAR ON ORGANIZATIONAL PSYCHOLOGY. 4 HOURS. May be repeated. Review of current topics, which are announced each quarter. Prerequisite: Consent of the instructor.

439. RESEARCH IN COUNSELING AND PSYCHOTHERAPY. 4 HOURS. Systematic review of special topics on individual treatment; emphasis on current research. Prerequisite: Psch 430 and consent of the instructor.

443. ADVANCED STATISTICS II. 4 HOURS. Chi-square and F-distributions, analysis of variance, individual comparisons, regression, and correlation analysis. Prerequisite: Psch 343 or the equivalent.

444. EXPERIMENTAL DESIGN AND ANALYSIS OF VARIANCE. 4 HOURS. Analysis of variance and testing of hypotheses concerning contrasts in means in advanced experimental designs used in behavioral research. Prerequisite: Psch 443 or the equivalent.

445. MULTIVARIATE ANALYSIS. 4 HOURS. The statistical analysis of functional relationships among two or more variables; various forms of correlations analysis; introduction to discriminant and factor analysis. Prerequisite: Psch 443 or the equivalent.

446. RESEARCH METHODS IN NATURALISTIC SETTINGS. 2 HOURS. Problems associated with the collection and analysis of data in naturalistic settings, emphasizing unobtrusive measures and the logic of causal emphasis based on correlational procedures and quasi-experimental designs. Prerequisite: Consent of the instructor.

447. PSYCHOLOGICAL MEASUREMENT. 4 HOURS. Scaling theory and methodology; emphasis on measurement in psychophysics, differential psychology, and social psychology. Prerequisites: Psch 343, and 315 or 356 or the equivalents.

448. TOPICS IN QUANTITATIVE PSYCHOLOGY. 4 HOURS. May be repeated for credit. Seminar on a preannounced topic in methodology, measurement, or mathematical psychology. Prerequisite: Consent of the instructor.

449. SEMINAR ON QUANTITATIVE METHODS IN PSYCHOLOGY. 2 HOURS. May be repeated. Systematic review of special topics; emphasis on current developments and applications. Prerequisite: Consent of the instructor.

450. TOPICS IN PHYSIOLOGICAL PSYCHOLOGY. 2 TO 4 HOURS. May be repeated. Methods, results, and interpretations of experiments concerned with the neuroanatomical, neurophysiological, and neuropharmacological bases of learning, emotion, and perception. Prerequisites: Psch 362, 363.

451. TECHNIQUES OF PSYCHOLOGICAL INTERVENTION. 4 HOURS. May be repeated if the instructor consents. Critical analysis of principles, techniques, and research in various types of psychological intervention. Each quarter the focus is on a different technique, such as behavior modification, psychotherapy, group therapy, play therapy, and community consultation. Prerequisite: Psch 430.

452. PHYSIOLOGICAL BASES OF EMOTION. 4 HOURS. Methods, results, and interpretations of experiments with the neuroanatomical, neurophysiological, neuropharmacological, and neuroendocrinological substrates of emotional behavior. Prerequisites: Psch. 362, 363.

453. PHYSIOLOGICAL BASES OF LEARNING AND MEMORY. 4 HOURS. Methods, results, and interpretations of experiments with the neuroanatomical, neurophysiological, and neuropharmacological substrates of conditioned behavior. Prerequisites: Psch 350, 362, 363.

455. PHYSIOLOGICAL BASES OF PERCEPTION. 4 HOURS. An advanced course. The neurophysiology of sensory and perceptual processes; physiology of peripheral receptor systems and data processing in central mechanisms. Prerequisite: Psch 362.

456. DISCRIMINATION LEARNING. 4 HOURS. Generalization, simultaneous and successive discrimination, secondary reinforcement, and choice behavior are studied with respect to various theoretical predictions. Oral presentations on related topics are required. Prerequisite: Psch 350.

461. ADVANCED INSTRUMENTATION IN PSYCHOLOGY. 4 HOURS. Design of electronic instrumentation in psychological research. Alternate years concentrate on linear (amplification) or digital (logic) devices. Prerequisite: Psch 361.

470. THEORIES OF LEARNING. 4 HOURS. Historical and methodological analysis of theoretical formulations of learning. Prerequisite: Psch 350.

472. THEORIES OF PERSONALITY. 4 HOURS. Contemporary theoretical formulations concerning personality and their evidential basis. Prerequisite: Psch 350 or 352.

473. ADVANCED PSYCHOPATHOLOGY. 4 HOURS. A core course for all graduate students in clinical psychology. Detailed consideration of disorders of behavior, including description, etiology, prognosis, and experimental and clinical research; development and function of classification systems. Prerequisite: Psch 472.

474. CLINICAL NEUROPSYCHOLOGY. 4 HOURS. The current status of work in clinical neuropsychology; focus on the behavioral consequences of cerebral dysfunction and on the efforts to synthesize information on these consequences into a cohesive and systematic understanding of the basic brain-behavior relationship in man. Prerequisite: Psch 473.

479. SEMINAR: THEORETICAL, HISTORICAL, AND PHILOSOPHICAL ISSUES IN PSYCHOLOGY. 2 HOURS. May be repeated. Same as History 479 and Philosophy 479. Systematic review of special topics; emphasis on current approaches and interpretations. Prerequisite: Consent of the instructor.

480. BEHAVIOR DISORDERS IN CHILDREN. 4 HOURS. Major types of maladjustment in childhood. Emphasis on the emotional, motivational, and intellectual difficulties of the culturally deprived. Prerequisite: Consent of the instructor.

482. PSYCHOLOGICAL APPRAISAL I: TEST DEVELOPMENT, INTELLECTUAL FUNCTIONS. 4 HOURS. Theory of test development and test assessment. Theory, research, and techniques relating to the assessment of intellectual abilities. Training in the administration, scoring, and interpretation of standard test methods.

483. PSYCHOLOGICAL APPRAISAL II: INTELLECTUAL FUNCTIONS AND STRUCTURED TESTS. 4 HOURS. Intelligence tests in clinical use. Theory and research relating to the development and use of structured tests for personality assessment. Training in the administration, scoring, and interpretation of structured tests. Prerequisite: Psch 482 or the equivalent.

484. PSYCHOLOGICAL APPRAISAL III: PROJECTIVE TECHNIQUES. 4 HOURS. Theory and research relating to the development and use of projective techniques for personality assessment. Training in the administration, scoring, and interpretation of projective techniques. Prerequisite: Psch 483 or the equivalent.

485. PRACTICUM IN PSYCHOLOGICAL APPRAISAL. 4 HOURS. May be repeated. Supervised practice in psychodiagnostic testing in various facilities associated with the graduate training program in clinical and counseling psychology. Prerequisites: Concurrent registration in Psch 482 or 484 and consent of the instructor.

487. PRACTICUM IN INSTRUCTION IN PSYCHOLOGY. 8 TO 12 HOURS. Supervised teaching of an undergraduate course and participation in a seminar dealing with techniques of course planning, teaching, and examining. Prerequisite: 6 hours of credit in Psch 490.

488. SEMINAR ON CLINICAL PSYCHOLOGY. 2 HOURS. Selected topics. Prerequisite: Consent of the instructor.

489. SEMINAR ON ADVANCED PSYCHODIAGNOSTICS. 4 HOURS. Consideration of a series of children and adolescents with varied behavior and school problems who have been studied intensively with psychodiagnostic procedures and for whom extensive follow-up data are available. Appropriate readings; clinical report writing. Prerequisites: Psch 484, 485, and consent of the instructor.

490. COLLOQUIUM ON THE TEACHING OF PSYCHOLOGY. 2 HOURS. May be repeated for a total of 6 hours. Satisfactory/unsatisfactory grade only. Problems and methods of teaching at the college level. Group discussion techniques; task analysis; test construction and analysis; curricular materials. Prerequisite: Graduate standing in the department.

491. COLLOQUIUM ON RESEARCH IN PSYCHOLOGY. 2 HOURS. May be repeated for a total of 6 hours. Satisfactory/unsatisfactory grade only. Discussion and evaluation of individual research projects; directed training in conducting research in different areas of psychology and in developing skills related to this research.

495. INDIVIDUAL RESEARCH. 2 TO 8 HOURS. May be repeated. Satisfactory/unsatisfactory grade only. Research on special problems not included in the graduate thesis. Prerequisite: Consent of the instructor.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Research on the topic of the graduate thesis. Prerequisites: Consent of the instructor; approval of the research prospectus by the thesis committee.

QUANTITATIVE METHODS

Professors: Brian Gluss, Leonard Kent

Associate Professors: Edward T. Minieka, Lalitha P. Sanathanan

Assistant Professors: John D. Lees, Donald W. Steinnes, Walter J. Wadycki

The Department of Quantitative Methods offers, in cooperation with the Department of Economics, sequences of courses in the program leading to the Master of Arts in Urban and Quantitative Economics.

Recently there has been a rapid growth of a body of knowledge in which mathematics and statistics are applied to the analysis of problems in business and economics. While these developments have been based on techniques drawn from matrix algebra, calculus, probability theory, and statistics, they have stimulated new types of mathematical analyses—linear programming, dynamic programming, theory of games, and other analytical techniques usually associated with operations research. Another offshoot of these developments has been a growing reliance on computers and systems analysis to solve real-world problems that are often too complex to be handled with strictly analytical techniques. The discipline of economics thus offers a new challenge to the mathematically sophisticated student. This program, offered by the Department of Quantitative Methods, enables such students to bring an analytical approach to problem-solving in both the public and the private sectors of the economy.

In addition to qualifying the student for a research or administrative career in government, business, or nonprofit institutions, the program enables graduates to find employment in such specialized fields as systems analysis, computer center operation, statistical quality control, and sampling. The quantitative methods sequence also provides continuing education for statisticians, economists, and systems analysts in the Chicago area interested in professional advancement in their specialties.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study and must submit scores from either the Graduate Record Examination advanced test in economics or the Admissions Test for Graduate Studies in Business. While no minimum score is required,

the faculty looks favorably on scores at or above the 70th percentile. In exceptional cases, students who have grade point averages of less than 4.00 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully.

Students with quantitatively oriented training—especially those with majors in business, economics, engineering, geography, mathematics, psychology, and statistics—are encouraged to apply. The following courses are required of all applicants, regardless of their undergraduate major:

Courses in mathematics containing material equivalent to the topics in Mathematics 104, 110, 111, and 112 at this University (mathematics through introductory calculus).

Courses in statistics equivalent to Quantitative Methods 270, 271, and 272 (statistics through regression analysis) in the College of Business Administration at this University.

One course in intermediate microeconomic theory and one course in macroeconomic theory.

If the preparation in these courses is not in evidence, the student must make up any deficiency within the first three quarters.

Degree Requirements

The student electing to take the quantitative methods sequence in the MA in Urban and Quantitative Economics must complete 48 quarter hours of satisfactory work consisting of 32 hours of core requirements listed below and 16 hours of electives to be taken within the Department of Quantitative Methods at the 300 or 400 level. The student must also participate in an internship program or independent study (Economics 497 or 498). The student who chooses the internship program receives credit for 4 hours of electives. The student who chooses Economics 498 receives credit for 4 hours of the core requirements.

Core Requirements: (32 hours)

Economics 401—Microeconomics I, 4 hours
Economics 411—Macroeconomics II, 4 hours
Economics 402—Microeconomics II, 4 hours
            or
Economics 412—Macroeconomics II, 4 hours
A 400-level course in applied economics, 4 hours. One of the following is recommended:

Economics 435—Advanced Econometrics
Economics 436—Advanced Mathematical Economics
Economics 471—Advanced Urban Economics I
Economics 472—Advanced Urban Economics II
Economics 497—Independent Study in Economics
Economics 498—Workshop in Economics

One additional elective course in economics at the 300 or 400 level, 4 hours
Quantititative Methods 472—Statistics, Theory and Applications, 4 hours
Quantitative Methods 360—Operations Research I, 4 hours *or*
Quantitative Methods 376—Survey of Operations Research, 4 hours
Quantitative Methods 375—Information Systems, 4 hours

Upon admission, each student develops an MA study plan, in collaboration with his graduate adviser, that will constitute his course of study during his enrollment.

The student must pass a comprehensive written examination based on three courses in economic theory. This examination includes one part on Microeconomics I, one part on Macroeconomics II, and one part on either Microeconomics II or Macroeconomics II. This comprehensive examination is distinct from the examinations given for the courses.

See also the Department of Economics listing.

Courses for Graduate and Advanced Undergraduate Students

360. OPERATIONS RESEARCH I. 4 HOURS. May be substituted for Systems Engineering 371. Credit is not given for both Quantitative Methods 360 and Systems Engineering 371. Linear programming: simplex algorithm, duality, sensitivity testing, convex programming, parametric programming. Transportation problem: solution techniques, relationship to linear programming, assignment. Applications. Prerequisites: Math 112, QM 271 or the equivalents. Business administration students must have declared a major.

361. OPERATIONS RESEARCH II. 4 HOURS. Nonlinear operations research. Nonlinear programming: optimality conditions, convexity, heuristic methods, applications. Inventory control theory: classical models, stochastic complications. Integer programming: enumerative techniques, cutting plane techniques. Prerequisite: QM 360 or 376 or the equivalent. Business administration students must have declared a major.

362. OPERATIONS RESEARCH III. 4 HOURS. May be substituted for Systems Engineering 350. Credit is not given for both Quantitative Methods 362 and Systems Engineering 350. Stochastic optimization problems. Markov chains, queuing theory, stochastic inventory control theory, dynamic programming. Prerequisites: Math 112, QM 272 or the equivalents. Business administration students must have declared a major.

369. MULTIVARIATE ANALYSIS I. 4 HOURS. Introduction to the structure and analysis of multivariate data, using the multivariate normal model. The relevant matrix theory; multilinear regression; tests concerning multivariate means; multivariate analysis of variance. Prerequisite: QM 369. Business administration students must have declared a major.

370. MULTIVARIATE ANALYSIS II. 4 HOURS. Multivariate techniques of data analysis in common use. Topics include principal components, factor analysis, canonical correlation, discriminant analysis classification procedures. Prerequisite: QM 369. Business administration students must have declared a major.

371. SURVEY RESEARCH. 4 HOURS. Application of sampling theory and methods to planning, conducting, and evaluating surveys for measuring public opinion and consumer attitudes and preferences. Instruments of measurement, sample design estimation, sources of errors and bias. Case studies with application to actual situations. Prerequisite: QM 272 or the equivalent.

373. ANALYSIS OF VARIANCE AND EXPERIMENTAL DESIGN. 4 HOURS. General theory of design and analysis of experiments. Least squares estimation, multiple regression, analysis of variance, randomization, randomized blocks, Latin

squares, factorial designs, replication, incomplete blocks. Prerequisite: QM 272. Business administration students must have declared a major.

375. INFORMATION SYSTEMS. 4 HOURS. Introduction to the theory and concepts of systems, including classification, deterministic and probabilistic models, Markov processes and Monte Carlo techniques, simulation. Introduction to the models as related to the computer; types of programming; experimentation and evaluation. Prerequisite: QM 272. Math 194 or 195 is recommended. Business administration students must have declared a major.

376. SURVEY OF OPERATIONS RESEARCH. 4 HOURS. Methods, techniques, and applications; linear programming, simulation, production and inventory theory, queuing theory, game theory. Prerequisites: QM 272, Math 112. Business administration students must have declared a major.

378. DYNAMIC PROGRAMMING. 4 HOURS. Theory and application to solving problems in multistage decision processes arising in a wide variety of fields, such as operations research, engineering, and mathematics. Deterministic and random processes are considered, and computational and analytical methods of solution derived. Prerequisites: Math 133, 220 or the equivalents. Business administration students must have declared a major.

380. PROBLEMS IN GRAPH THEORY. 4 HOURS. May be substituted for Systems Engineering 460. Credit is not given for both Quantitative Methods 380 and Systems Engineering 460. Same as Mathematics 380. Optimization problems: theory and solution. Shortest path problems. Transportation problems: maximum flows, dynamic flows, parametric flows. Matching problems: coverings, spanning trees, perfect graphs. Urban scheduling problems: traveling salesman problem, postman problem. Prerequisite: QM 376.

399. INDEPENDENT STUDY IN QUANTITATIVE METHODS. 1 TO 4 HOURS. May be repeated for a total of 12 hours. Intensive study of selected topics determined in consultation with the instructor and department head. Prerequisites: Major in quantitative methods and consent of the department head.

Courses for Graduate Students

470. MATHEMATICAL METHODS I. 4 HOURS. Designed primarily to introduce and/or review areas of mathematics necessary for the development and understanding of the analytic tools students will encounter in subsequent courses of a Master of Business Administration program. Elementary set theory; mathematical functions; introduction to probability concepts; differential and integral calculus; series; functions of several variables. Prerequisites: Math 110, 111, 112; QM 270, 271, 272.

471. MATHEMATICAL METHODS II. 4 HOURS. Sets and set functions; vector and matrix algebra; introduction to linear programming and game theory. At least one hour per week of laboratory in the use of application of digital computers and developments in computer technology applicable to modern business operations. Prerequisites: Math 110, 111, 112; QM 270, 271, 272.

472. STATISTICS: THEORY AND APPLICATIONS. 4 HOURS. Statistics and scientific method; uncertainty and probability, including Bayesian theory; binomial normal, t, Chi square, and F distributions; testing hypotheses and estimation; decision theory; analysis of variance, including regression and correlation; time series. Prerequisites: Math 110, 111, 112; QM 270, 271, 272.

474. STATISTICAL DECISION THEORY. 4 HOURS. Hypothesis testing from the classical and Bayesian viewpoints with applications of probability to the making of decisions; some treatment of game strategy and its parallels in decision-making. Prerequisite: QM 472.

475. BUSINESS RESEARCH AND FORECASTING. 4 HOURS. The role of research in business; forecasting methods and techniques, including models and their applications. Prerequisite: QM 472.

SLAVIC LANGUAGES AND LITERATURES

Professors: Nicholas Moravcevich, Head of the Department; Tymon Terlecki

Associate Professors: Elizabeth Pribic, Biljana Sljivic-Simsic

Assistant Professors: George Gutsche, Bohdan Rubchak

The Department of Slavic Languages and Literatures offers course work leading to a Master of Arts with specializations in Russian cultural heritage, Polish cultural heritage, and Slavic linguistics, including individual options in Ukrainian, Serbo-Croatian, and Czech studies.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university (or the equivalent from a foreign university) and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study and must submit three letters of recommendation. In exceptional cases, students who have averages of less than 4.00 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Applicants whose undergraduate major was not in Slavic studies and those from other institutions must take a written and an oral proficiency test in either Russian or Polish and must remedy any deficiencies in their preparation before being granted full standing in the graduate program.

The Graduate Record Examination is not required.

Degree Requirements

Credit Distribution. A minimum of 56 quarter hours of credit is required, distributed as follows:
   A. *Ethnic Studies.* A basic core sequence of two courses totaling 8 quarter hours offered by the Department of Sociology and required of all candidates.
   B. *Slavic History or Political Science.* A choice of two courses totaling 8 quarter hours offered by the Departments of History and Political Science to be selected with the approval of the Department of Slavic Languages and Literatures.
   C. *Elective Areas of Specialization* (Russian cultural heritage, Polish cultural heritage, Slavic linguistics). A sequence of courses totaling at

least 32 quarter hours, with a minimum of 16 hours at the 400 level. Candidates in the areas of cultural heritage must present at least 8 of the required 32 quarter hours in the linguistics program; and those in the linguistics area, at least 8 quarter hours in a cultural heritage program of their choice.

D. *Electives.* Eight quarter hours at the 300 or 400 levels chosen from A, B, or C above.

Comprehensive Examination. The examination consists of three parts. Parts One and Two test the student's preparedness in ethnic studies and Slavic history or political science. Part Three, based on both course work and the department reading list, tests the student's preparedness in his area of specialization. Those who fail the examination may retake any portion(s) no later than one calendar year after the first attempt.

A thesis is not required.

Master of Arts Program for Teachers

Candidates who desire to prepare for high school teaching but have not earned state certification during their undergraduate study can, in consultation with their advisers, elect a program in either cultural heritage or linguistics that would also include the course work required for certification. Such work, however, is in addition to the department MA requirements.

Part-Time Study

Part-time enrollment (through the availability of late afternoon and summer session programs) can be selected by those candidates whose employment or other obligations exclude their full-time participation in the program.

Courses for Graduate and Advanced Undergraduate Students

300. INTRODUCTION TO BIBLIOGRAPHY AND RESEARCH. 0 HOURS. Required of all graduate students in Slavic studies. Bibliographical and research tools applicable to Slavic studies. Prerequisite: Graduate standing or consent of the instructor.

310. INTRODUCTION TO SLAVIC LINGUISTICS. 4 HOURS. Survey of fundamental linguistic concepts and investigation of theoretical methods most applicable to analysis of the Slavic languages. Prerequisites: Graduate standing and two years of Russian or some other Slavic language; advanced undergraduate students with exceptional ability may be admitted with the consent of the instructor.

390. ENGLISH-SLAVIC LINGUISTIC INTERACTION. 4 HOURS. The structural, phonetic, and idiomatic influence of English on the various Slavic languages spoken in the American-Slavic ethnic communities. Slavic influence on English spoken in such communities. Prerequisite: Slav 310.

399. INDEPENDENT STUDY. 1 TO 4 HOURS. Investigation of special problems under the general direction of a staff member. Prerequisite: Consent of the instructor and the head of the department.

Courses for Graduate Students

410.   OLD CHURCH SLAVONIC. 4 HOURS. Phonology, morphology, and basic elements of the syntax. Readings in selected texts. Prerequisite: At least three years of college Russian.

420.   COMPARATIVE SLAVIC LINGUISTICS. 4 HOURS. A diachronic study of the relationship between the Slavic languages; their place within the Indo-European language family. Prerequisites: Slav 310, 410.

POLISH

Courses for Graduate and Advanced Undergraduate Students

301.   ADVANCED POLISH CONVERSATION AND COMPOSITION I. 4 HOURS. Development of oral and writing skills: expanding vocabulary, developing style. Aural comprehension practice. Prerequisite: Pol 203 or the equivalent.

302.   ADVANCED POLISH CONVERSATION AND COMPOSITION II. 4 HOURS. Continues Polish 301. Prerequisite: Pol 301 or the equivalent.

303.   ADVANCED POLISH CONVERSATION AND COMPOSITION III. 4 HOURS. Continues Polish 302. Prerequisite: Pol 302 or the equivalent.

340.   POLISH ROMANTICISM. 4 HOURS. Polish-Russian literary relationship during the Romantic period; major works of Mickiewicz, Slowacki, Krasinski, and Norwid. Prerequisite: Junior standing.

341.   THE POLISH NOVEL. 4 HOURS. Major works from the eighteenth century to the present. Emphasis on Krasicki, Sienkiewicz, Prus, Orzeszkowa, Zeromski, Nalkowska, Dabrowska. Prerequisite: Junior standing.

342.   POLISH DRAMA. 4 HOURS. Major plays of Fredro, Mickiewicz, Slowacki, Kransinski, Wyspianski, Witkiewicz, Gombrowicz, and Mrozek. Prerequisite: Junior standing.

399.   INDEPENDENT STUDY. 1 TO 4 HOURS. Investigation of special problems under the general direction of a staff member. Prerequisite: Consent of the instructor and the head of the department.

Courses for Graduate Students

405.   STRUCTURE OF MODERN POLISH. 4 HOURS. A synchronic linguistic analysis of Polish substantives, pronouns, verbs, deverbal nouns, and minor parts of speech from a syntagmatic and paradigmatic point of view. Prerequisite: Slav 310.

410.   POLISH RENAISSANCE AND BAROQUE LITERATURE. 4 HOURS. Comparative study of the most significant trends in the poetry and prose of the two periods.

412.   POLISH CLASSICISM AND ROMANTICISM. 4 HOURS. Aesthetic concepts of Polish literature in the second half of the eighteenth and first half of the nineteenth centuries. Major tendencies, features, and works.

415. HISTORY OF THE POLISH LANGUAGE. 4 HOURS. Phonological and morphological development; emphasis on lexical, syntactical, and stylistic problems. Linguistic analysis of selected texts. Prerequisite: Slav 410.

420. POLISH POSITIVISM AND YOUNG POLAND. 4 HOURS. The specific Polish variants of European realism and symbolism in the second part of the nineteenth and the beginning of the twentieth centuries.

425. TWENTIETH-CENTURY POLISH LITERATURE IN POLAND AND ABROAD. 4 HOURS. The Polish literary scene during the Second Independence (1919 to 1939) and post-war (1945 to 1965) periods.

450. MICKIEWICZ, SLOWACKI, AND NORWID. 4 HOURS. The three greatest Polish poets of the Romantic era analyzed through their most outstanding works.

455. SIENKIEWICZ, ZEROMSKI, AND REYMONT. 4 HOURS. Three leading Polish novelists of the late nineteenth and early twentieth centuries considered as upholders of the traditional and promoters of the modern concepts of the novel.

470. POLISH LITERARY CRITICISM IN THE NINETEENTH AND TWENTIETH CENTURIES. 4 HOURS. Major developments in Polish pre-Romantic, Romantic, positivist, modernist, and contemporary periods.

RUSSIAN

Courses for Graduate and Advanced Undergraduate Students

301. ADVANCED RUSSIAN CONVERSATION AND COMPOSITION I. 4 HOURS. The development of oral and writing skills: vocabulary building, style development; aural comprehension practice. Prerequisite: Russ 203 or the equivalent.

302. ADVANCED RUSSIAN CONVERSATION AND COMPOSITION II. 4 HOURS. Continues Russian 301. Prerequisite: Russ 301 or the equivalent.

303. ADVANCED RUSSIAN CONVERSATION AND COMPOSITION III. 4 HOURS. Continues Russian 302. Prerequisites: Russ 302 or the equivalent.

307. METHODOLOGICAL PROBLEMS IN RUSSIAN INSTRUCTION. 4 HOURS. Analysis and discussion of special methodological problems connected with the teaching of Russian. Prerequisite: Russ 203 or the equivalent.

308. RUSSIAN APPLIED LINGUISTICS FOR TEACHERS. 4 HOURS. Classroom application of linguistic principles and techniques. Prerequisite: Russ 203 or the equivalent.

320. RUSSIAN POETRY: 1750 TO 1830. 4 HOURS. Lomonosov, Derzhavin, Krylov, Pushkin, and others. Prerequisite: 24 hours of Russian.

321. RUSSIAN POETRY: 1830 TO 1890. 4 HOURS. Zhukovsky, Lermontov, Nekrasov, Tyutchev, Fet, and others. Prerequisite: 24 hours of Russian.

322. RUSSIAN POETRY: 1890 TO THE PRESENT. 4 HOURS. Bely, Blok, Akhmatova, Mandelshtam, Yesenin, Mayakovsky, Pasternak, Yevtushenko, Voznesensky, and others. Prerequisite: 24 hours of Russian.

324. STUDIES IN NINETEENTH-CENTURY RUSSIAN LITERARY CRITICISM. 4 HOURS. Belinsky, Chernyshevsky, Herzen, Dobrolyubov, Pisarev, L.N. Tolstoy. Prerequisite: Slav 224.

327. RUSSIAN DECADENCE AND SYMBOLISM. 4 HOURS. Poetry and prose from 1890 to 1910. Birusov, Sologub, Balmont, Belyi, Blok, and others. Prerequisite: 24 hours of Russian.

332. PROBLEMS IN RUSSIAN GRAMMAR. 4 HOURS. May be repeated once for credit. Required for Russian teaching majors. Intensive study and review of problems of Russian grammar and syntax. Prerequisite: Russ 201.

350. THE RUSSIAN NOVEL TO 1860. 4 HOURS. Pushkin, Lermontov, Gogol, Goncharov, Chernyshevsky. Prerequisite: Junior standing.

351. THE RUSSIAN NOVEL: 1860 TO 1900. 4 HOURS. Turgenev, Saltykov-Shchedrin, L.N. Tolstoy, Dostoevsky. Prerequisite: Junior standing.

352. THE RUSSIAN NOVEL: 1900 TO THE PRESENT. 4 HOURS. Gorky, Zamyatin, Sholokhov, A.N. Tolstoy, Ehrenburg, Pasternak, Bulgakov, Solzhenitsyn. Prerequisite: Junior standing.

360. NINETEENTH-CENTURY RUSSIAN DRAMA. 4 HOURS. Major dramatists from Griboedov to Chekhov. Prerequisite: Slav 224 or Spch 122.

361. TWENTIETH-CENTURY RUSSIAN DRAMA. 4 HOURS. Major authors from Gorky to the present. Prerequisite: Slav 244 or Spch 122.

399. INDEPENDENT STUDY. 1 TO 4 HOURS. Investigation of special problems under the general direction of a staff member. Prerequisite: Consent of the instructor and the head of the department.

Courses for Graduate Students

401. STRUCTURE OF MODERN RUSSIAN. 4 HOURS. A synchronic linguistic analysis of Russian substantives, adjectives, pronouns, verbs, deverbal nouns, and minor parts of speech from a syntagmatic and paradigmatic point of view. Prerequisite: Slav 310.

411. HISTORY OF THE RUSSIAN LANGUAGE. 4 HOURS. Formation and development of standard Russian to the end of the eighteenth century. Analysis of selected texts. Prerequisite: Slav 410.

440. PRE-NINETEENTH-CENTURY RUSSIAN LITERATURE. 4 HOURS. Kievan, provincial, and Muscovite literatures; poetry and drama from 1730 to 1800; beginnings of Russian prose; theoretical treatises on prosody. Kantemir, Trediakovsky, Lomonosov, Sumarkov, Fonvizin, Karamzin, and others.

450. PUSHKIN AND LERMONTOV. 4 HOURS. Analysis of major lyrics, narrative poems, dramas, and prose.

455. GOGOL AND DOSTOEVSKY. 4 HOURS. Critical study of the major novels and short stories.

460. TURGENEV AND TOLSTOY. 4 HOURS. Analysis of major works; emphasis on the evolution of artistic and philosophical ideas and their impact on Russian literature.

465. CHEKHOV AND GORKY. 4 HOURS. Critical study of the drama and major prose of both authors in light of the Russian prerevolutionary intellectual and aesthetic currents.

475. PROSE LITERATURES OF THE SOVIET PERIOD. 4 HOURS. Historical and critical study since the October Revolution.

480. RUSSIAN POETRY: 1910 TO 1930. 4 HOURS. Acmeist, Futurist, and imagist verse. Akhmatova, Mandelshtam, Maiakovskii, Esenin, Pasternak, and others.

485. RUSSIAN-POLISH LITERARY RELATIONS IN THE NINETIETH AND TWENTIETH CENTURIES. 4 HOURS. Affinities between Mickiewicz and Pushkin; the Polish and Russian novel in the twentieth century; Polish and Russian symbolists; the Skamanderites and acmeists; the ego-futurists and cubo-futurists.

SOCIAL WORK

Professors: Mark P. Hale, Director; George W. Magner, Associate Director; W. Paul Simon, Mary Sullivan, Samuel Weingarten, Imogene Young, Sidney Zimbalist

Associate Professors: Claire M. Anderson, Eloise J. Cornelius, H. Frederick Brown, Frieda Engel, James Forkeotes, Joseph R. Godwin, Joy Johnson, Kenneth Krause, Edwin Marksman, Ord Matek, Harvey Treger, Narayan Viswanathan

Assistant Professors: Leona B. Cain, Lenora Cartright, John C. Dietmann, Almera Lewis, Clarence Lipschutz, Ruth Meyer, Seymour Mirelowitz, Christopher G. Narcisse, Jeanore Parham, Sylvia Vedalakis, Dorothy R. Young

The Jane Addams School of Social Work offers, on both the Chicago Circle and the Urbana campuses, programs of professional study that lead to the Master of Social Work and the Doctor of Social Work.

Master of Social Work

The MSW program of the Jane Addams School is designed to give the student the knowledge, skills, attitudes, and philosophy basic to all professional social work practice rather than merely to prepare him for positions in specific agencies. Within each of the concentrations are organized curriculum areas that include human growth and behavior, social work practice, welfare policy and services, and social research. At Chicago Circle most of the second-year offerings are electives, which allow the student to pursue individual career interests. In both years an extensive field, or direct practice, experience is required.

In Chicago, field work is generally concurrent with class work, although several alternate models are being tested. The student will usually be placed in two distinct settings, with attention to career interests and desired method of practice (such as casework, group work, community organization). There are a few instances where deference is given an agency from which a student holds a scholarship.

Much of the first-year program of the Jane Addams School of Social Work at Chicago Circle is mandatory and is made up of those courses considered generic to all aspects of social work practice. Students who enter the school with a strong undergraduate social welfare background may, upon satisfactorily demonstrating the necessary knowledge base, have some of these requirements waived. The first-year courses generally include a social work method or a combination of methods, welfare policy and services, an overview of community organization practice, social work research, human growth and behavior (with a dual focus on ego psychology and social science theory), and field instruction. In the second year there is a great deal of flexibility, and a number of electives and alternatives are available in all of the major concentrations, social treatment, community organization and planning, and social welfare policy.

Admission Requirements for the Master of Social Work

A satisfactory undergraduate scholastic record, 20 hours in the social sciences, and evidence of personal suitability for the field are the basic requirements. The minimum undergraduate grade point average is 3.75 (A=5.00), and only under unusual circumstances is consideration given to an applicant with a grade point average below 3.75.

Since the number of possible enrollments is limited and new students are admitted only in the fall quarter, early application is advisable. Scholarships and fellowships are available through the school and through many public and private social agencies.

A bulletin about the school and application forms may be obtained by writing the Jane Addams School of Social Work at Chicago Circle, Box 4348, Chicago, Illinois 60680. A listing of agencies and field instructors is included in the bulletin.

Degree Requirements for the Master of Social Work

Hours. Candidates must successfully complete 96 quarter hours of graduate work (including work in each of the four general areas) with a cumulative grade point average of 4.00, which is required if a candidate is to remain in good standing. Those whose average falls below 4.00 in any quarter will be placed on probation and will be required to achieve a 4.00 minimum cumulative average by the end of the year.

Residence. A minimum of 36 quarter hours of resident credit is required; the candidate must carry a full program (12 quarter hours) at Chicago Circle for at least three consecutive quarters. A maximum of 48 hours of credit may be transferred for work taken elsewhere.

Time Limit. All requirements must be completed within six years. Military service is deducted. Exceptions may be made only in unusual circumstances. Several plans have been developed for spreading the degree program over a three-year period with one year devoted to full-time work in residence.

Courses for Graduate Students

Prospective students should note that the curriculum of the school is undergoing extensive modification. Therefore, the following courses reflect only a portion of the total being developed. For example, in addition to the social treatment courses listed, other electives include clinical diagnosis, crisis intervention, treatment with children, advanced group dynamics, treatment with adolescents, and others. In the foundation courses within the human growth and behavior area are such electives as human sexuality, drug abuse, majority and minority cultural interaction, the black experience, theories of personality, and theories of psychotherapy. There will also be available in the 1974-75 academic year a number of courses within the newer concentrations—community organization and planning and social welfare policy and administration. Because many of these are still being processed, they cannot be included in this bulletin.

Doctor of Social Work

The DSW program of the Jane Addams School is designed to increase the number of persons who have the knowledge and skills to develop and direct social welfare programs. It provides preparation for leadership in teaching, research, policy analysis and development, and social welfare administration.

The doctoral program is interdisciplinary and strongly emphasizes research. The student is expected to choose an area of specialization, some examples of which are listed below:

> Information Systems for Community Planning
> Theories of Process in Social Treatment
> Social Welfare Manpower Planning
> Community Mental Health Planning
> Social Policy for the Aged

An individualized plan of study provides a wide range of possibilities, especially since a minor in a field outside social work is expected. The student is encouraged to select and develop a dissertation topic in the first three quarters of residence.

Admission Requirements for the Doctor of Social Work

The Doctor of Social Work program is open to students who have had advanced education in the human service professions or in related social sciences. Most entering students are expected to have an MSW, although this is not a requirement.

A 4.00 average (A=5.00) is required for consideration, as are the Miller Analogies Test and the Graduate Record Examination. An admission committee, composed of social work faculty from both the Chicago and the Urbana divisions, processes all applications.

Degree Requirements for the Doctor of Social Work

The DSW is awarded upon completion of the following requirements:

1. A minimum of 144 units of course work and applied research beyond the baccalaureate, of which at least 24 units are in courses outside the Jane Addams School of Social Work.
2. A social work practicum or acceptable experience in lieu thereof.
3. A preliminary examination on substantive knowledge and a dissertation topic.
4. A dissertation based on original research or scholarly analysis of a professional problem or issue.
5. A final examination.

Since the Doctor of Social Work is a highly individualized program, interested persons should communicate with the director of the DSW program at the school for additional information.

Courses for Graduate and Advanced Undergraduate Students

300. METHODS OF SOCIAL WORK INTERVENTION. 2 TO 4 HOURS. The basic concepts of social casework, social group work, and combined methods. Analysis and study of underlying philosophy, values, and principles. Skills used in working with groups, individuals, and families.

305. EDUCATION POLICY FOR CITIZENS. 4 HOURS. Same as Education 305. The concepts and information that all citizens need to participate effectively as education consumers and policy affectors. History, economics, basic statistics, sociology, research, and current and future trends affecting American education at all levels. Prerequisite: Consent of the instructor.

321. COMBINED TREATMENT METHODS I. 1 TO 4 HOURS. Identification of components of social work practice including underlying philosophy, concepts, generic principles, values, and methods of social casework and group work. Similarities and differences in the two primary social work treatment methods. Emphasis on the social worker's role in offering service through a professional relationship in case and group situations. Prerequisite: Undergraduate degree or consent of the instructor.

325. COMMUNITY ORGANIZATION. 2 TO 4 HOURS. Principles, concepts, and methods of community organization in social work at the neighborhood, local, state, national, and international levels.

337. OBSERVATION-SIMULATION LABORATORY. 2 TO 4 HOURS. Observation and simulation of a broad range of organization and planning experiences, coordinating basic theories presented in introductory community organization courses with contemporary practice. Prerequisite: Credit or concurrent registration in SocW 325.

341. HUMAN GROWTH AND BEHAVIOR I. 3 TO 6 HOURS. The major forces influencing the growth and behavior of the individual from birth through adolescence. Sociocultural, familial, physical, emotional, and intellectual factors as they enhance or retard social functioning. The relevance of this content to the profession of social work is constantly considered.

371.   SOCIAL SERVICES AND WELFARE POLICY I. 2 TO 4 HOURS. The function, nature, and scope of the social welfare institution. Social services as a response to social, personal, and economic problems of people. Effects of economic and social growth and change on the welfare enterprise.

372.   SOCIAL SERVICES AND WELFARE POLICY II. 2 TO 4 HOURS. Current provisions and alternatives for their solution in the social security and money assistance programs. Prerequisite: SocW 371.

Courses for Graduate Students

401.   SOCIAL CASEWORK I. 2 TO 4 HOURS. Analysis and study of the underlying philosophy, concepts, generic principles, and methods of social casework; role of the caseworker in offering service through a professional relationship.

402.   SOCIAL CASEWORK II. 2 TO 4 HOURS. Continues development of social casework concepts and principles through analysis of case material from secondary settings. Psychological and cultural factors that affect the treatment process. Analysis of the interconnectedness of relationship, study-diagnosis, and treatment phases of social casework. Prerequisite: SocW 401.

403.   SOCIAL CASEWORK III. 2 TO 4 HOURS. Continues Social Work 402. Emphasis on increased independent analysis of case material and use of relevant source material related to specific cases. Greater integration of philosophy, concepts, and principles. Prerequisite: SocW 402.

404.   SELECTED TREATMENT METHODS. 3 TO 6 HOURS. Intensive study of particular applications of social work practice. Theory base and skill development in the use of methods. Typical sections in family diagnosis and treatment, crisis intervention, advanced casework, and interrelated treatment models. Prerequisites: SocW 403 or 414 or 423; SocW 442.

405.   TREATMENT METHODS WITH FAMILIES. 3 TO 6 HOURS. May be repeated. Social treatment methods adapted to helping families confronted by stress and special problems; families of the mentally or physically ill, inner-city families; treatment of the family as a unit. Prerequisites: SocW 403 or 413 or 423; SocW 442.

406.   SOCIAL WORK TREATMENT WITH CHILDREN. 3 TO 6 HOURS. May be repeated for credit. Specific characteristics of direct strategies and techniques applicable to problems of children. Individual and group methods as related to identified needs and problem areas. Prerequisites: SocW 403 or 413 or 423; SocW 442.

407.   CONSULTATION AND SUPERVISION IN SOCIAL WORK. 3 TO 6 HOURS. May be repeated. Theory and practice relevant to the delivery of social work services and the enhancement of social work practice; supervision in practice and consultation in social treatment. Prerequisites: SocW 403 or 413 or 423; SocW 443.

408.   TREATMENT THEORIES IN SOCIAL WORK. 2 TO 4 HOURS. May be repeated. Theories and constructs utilized in social treatment; significance and applicability to practice. Theories of psychotherapy; therapeutic group work; variables based on schools of thought, such as transactional analysis, behaviorism, and others. Prerequisites: SocW 403 or 413 or 423; SocW 442.

409.   CRISIS INTERVENTION. 2 TO 4 HOURS. Theoretical formulations of crisis intervention and their applicability to short-term treatment methods; emphasis on the process of short-term treatment as related to social work methods. Prerequisite: SocW 403 or consent of the instructor and the adviser.

411.   SOCIAL GROUP WORK I. 2 TO 4 HOURS. Group work method, with focus on the worker's problems and procedures in understanding the group, its objectives, and its relationship to the agency. Beginning formulation of the worker's role in reference to assessment, interaction, and small-group theory.

412.   SOCIAL GROUP WORK II. 2 TO 4 HOURS. Further emphasis on group methods, with intensive application of understanding and working with individuals in the group and in the agency. Social work practice with groups, including relationship, use of program, and the helping processes. Prerequisite: SocW 411.

413.   SOCIAL GROUP WORK III. 2 TO 4 HOURS. The integration of concepts in the worker's role with the individual and the group; the referral processes. The worker's role as a strategy in intervention is developed. Prerequisite: SocW 412.

414.   SOCIAL GROUP WORK IV. 2 TO 4 HOURS. Advanced principles of work in direct service with the group, advanced group theory, and concepts of group stress and crisis situations. The development of criteria for analysis of the worker's role. Prerequisite: SocW 413.

415.   SOCIAL GROUP WORK V. 2 TO 4 HOURS. Further development of the concepts of the worker's role in direct service, with refinements illustrated from analysis of treatment groups in special settings. Work with individuals, family groups, and interdisciplinary elements in collaboration. Prerequisite: SocW 414.

416.   SOCIAL GROUP WORK VI. 2 TO 4 HOURS. The final course in the group work sequence. The integration of method and analysis of the student's own practice. Emphasis on the wider role of organizing and supervising group services. Selected concepts of subexecutive and supervisory functions are identified. Current issues and new modalities in social work groups are developed. Prerequisite: SocW 415.

418.   SOCIAL WORK TREATMENT WITH ADOLESCENTS. 3 TO 6 HOURS. May be repeated. Intensive study of social treatment models used with adolescents; presenting problems; phases of development of individual and group approaches with adolescents and families. Prerequisite: SocW 403 or 413 or 423; SocW 442.

419.   THE ADOLESCENT AND HIS FAMILY GROUP. 3 HOURS. Diagnostic understanding of the adolescent and the family group with which he lives. Developmental study of the growth of families, the impact of an adolescent on the family system, and the impact of the family system on the adolescent. Both normal and abnormal development are considered. Prerequisites: SocW 443 and an introductory course in group processes.

422.   COMBINED TREATMENT METHODS II. 2 TO 4 HOURS. Examination of social work practice theory through the development of different casework and group approaches. The worker's role is analyzed in terms of specific intervention strategies based on different theoretical orientations. A conceptual model framework is utilized to compare theories. Casework and group work models are analyzed separately and compared. Prerequisite to be determined.

423. COMBINED TREATMENT METHODS III. 2 TO 4 HOURS. Integration and application of social casework and group work concepts to social work practice. Emphasis on the worker's activity in serving clients with different kinds of problems in different social work settings. Generic and specific aspects of casework and group work practice. Prerequisite: SocW 422.

427. PRACTICE IN SETTINGS FOR CHILDREN AND ADOLESCENTS. 3 TO 6 HOURS. May be repeated. Practice with children and adolescents in such settings as residential treatment, schools, and child welfare agencies. The impact of the setting on clients. Implications for function, planning, and provision of services. Prerequisites: SocW 403 or 413 or 423; SocW 442.

428. PSYCHOLOGICAL PATHOLOGY AT LIFE CYCLE STAGES. 3 TO 6 HOURS. May be repeated. Diagnostic formulation and social work treatment patterns for various emotional disorders and illnesses that occur in childhood, adolescence, and maturity. Prerequisite: SocW 442.

431. FIELD INSTRUCTION I. 3 TO 6 HOURS. The student is assigned to a social agency where, under the supervision of a field instructor, he carries selected cases or groups for direct service to the agency clientele. Prerequisite: Credit or concurrent registration in SocW 401 or 411.

432. FIELD INSTRUCTION II. 3 TO 6 HOURS. The student is assigned to a social agency where, under the supervision of a field instructor, he carries selected cases or groups for direct service to the agency clientele. Prerequisite: Credit or concurrent registration in SocW 402 or 412.

433. FIELD INSTRUCTION III. 3 TO 6 HOURS. The student is assigned to a social agency where, under the supervision of a field instructor, he carries selected cases or groups for direct service to the agency clientele. Prerequisite: Credit or concurrent registration in SocW 403 or 413.

434. FIELD INSTRUCTION IV. 4 TO 8 HOURS. The student is assigned to a social agency where, under the supervision of a field instructor, he carries selected cases or groups for direct service to the agency clientele. Prerequisite: Credit or concurrent registration in SocW 404 or 414.

435. FIELD INSTRUCTION V. 4 TO 8 HOURS. The student is assigned to a social agency where, under the supervision of a field instructor, he carries selected cases or groups for direct service to the agency clientele. Prerequisite: Credit or concurrent registration in SocW 405 or 415.

436. FIELD INSTRUCTION VI. 4 TO 8 HOURS. The student is assigned to a social agency where, under the supervision of a field instructor, he carries selected cases or groups for direct service to the agency clientele. Prerequisite: Credit or concurrent registration in SocW 406 or 416.

438. PRACTICE LABORATORY. 4 TO 8 HOURS. Students and faculty team with community organizations or agencies in problem-solving projects. Development of specific plans, program proposals, or evaluation reports. Focus on beginning practice skills. Prerequisite to be determined.

439. EXTERNSHIP IN COMMUNITY PRACTICE. 8 TO 12 HOURS. Intensive field experience under professional supervision in a community organization or planning agency in conjunction with faculty-led practice seminars. Externships provide a range of skill development in community organization and planning practice. Prerequisite: SocW 438 or 433.

442. HUMAN GROWTH AND BEHAVIOR II. 3 TO 6 HOURS. The individual's growth and behavior from early through late adulthood. The essential developmental tasks and central conflicts for each major life phase, with focus on differentiating kinds of knowledge about personality and social functioning. Prerequisite to be determined.

443. HUMAN GROWTH AND BEHAVIOR III. 3 TO 6 HOURS. The nature and dynamics of social processes as related to growth and behavior. Study is centered on various groups within society—the family, class, ethnic groups, and caste—and on the manner in which they influence individual personality development. The process of interaction and the meaning of membership within small groups. Role expectations and the dynamics of small-group membership, particularly in the family. The continuous process of change of group life and its effect on behavior. Prerequisite: SocW 442.

444. TREATMENT ASPECTS OF REHABILITATION. 2 TO 4 HOURS. Study and analysis of the impact of catastrophic illness, disease, and rehabilitation procedures on the individual and his family; emphasis on the role of the social worker. Prerequisite: SocW 443.

445. ADVANCED STUDIES IN PSYCHOSOCIAL DEVELOPMENT. 3 TO 6 HOURS. May be repeated. Psychosocial development at specific age levels. Various approaches to personality theory and social work practice. Advanced ego psychology. Psychosocial factors in aging. Prerequisite: SocW 442.

446. ANALYSIS AND STUDY OF PROBLEMS OF THE AGING. 3 HOURS. The physical, psychic, and economic aspects of aging, with reference to the contribution of ego psychology and certain social sciences theories. The relevance of such study to the provision of social services to individuals and groups and the planning of comprehensive health service. Prerequisite: SocW 443 or consent of the instructor and the student's adviser.

447. HUMAN SEXUALITY: SOCIAL WORK APPLICATIONS. 2 TO 4 HOURS. How sexuality develops and is manifested and how it serves as an expression of self-image in normal and maladjustive behavior. Teaching of the skills in dealing knowledgeably and sensitively with sexual concerns to help students feel more comfortable with their professional role in dealing with the intimate interactions of persons.

448. DRUG AND ALCOHOL ABUSE AND SOCIAL WORK PRACTICE. 3 TO 6 HOURS. May be repeated. Major classes of drugs and other abused substances. Factors related to drug abuse. Treatment methods, legal controls. Dynamics of alcholism as a social problem; social work treatment implications. Prerequisites: SocW 442 and 403 or 413 or 423.

449. MAJORITY AND MINORITY CULTURAL INTERACTION. 2 TO 4 HOURS. Same as Urban Planning and Policy 438. Critical examination of the nature and development of status and economic factors likely to be important in accounting for majority and minority cultural interaction. Analysis of various conditions under which competition with minorities may or may not result in discrimination. Implications of this analysis for social work practice and the role of the professional social worker.

451. COMMUNITY PROBLEM-SOLVING. 2 TO 4 HOURS. Same as Urban Planning and Policy 439. Introduction to the nature and scope of social work intervention at the community level. Analysis of distinctive characteristics of the community as the locus for various social systems; emphasis on their implications for practice. Appropriate methods of problem-solving. Prerequisite: SocW 425.

452. COMMUNITY DEVELOPMENT. 2 TO 4 HOURS. Same as Urban Planning and Policy 440. Community development theory and practice are analyzed and evaluated with given practitioner roles, community resources, client systems, and other means of change and development as affected by a variety of social, cultural, political, economic, geographic, and historical considerations, both foreign and domestic. Emphasis on the conditions students are likely to encounter in actual practice. Prerequisite: SocW 451.

453. COMMUNITY PLANNING. 2 TO 4 HOURS. Same as Urban Planning and Policy 434. A range of approaches to community planning; special emphasis on their application to the development and implementation of social welfare programs. Various levels of planning and their relationship to other planning professions. Professional skills included are technical data collection, political processes, grantsmanship, citizen involvement, advocacy roles, and models for evaluation. Prerequisite: SocW 451.

461. SPECIAL STUDIES IN SOCIAL WORK. 2 TO 6 HOURS. Independent or group study in areas of special interest; application of social work principles to special problems or settings.

473. SOCIAL SERVICES AND WELFARE POLICY III. 2 TO 4 HOURS. Prerequisite to be determined.

474. SOCIAL SERVICES AND WELFARE POLICY IV. 2 TO 4 HOURS. Current provisions and critical evaluation of welfare policy issues; alternatives for their solution in the social services for the aged, children, court wards, and the mentally and physically ill. Prerequisite: SocW 473.

475. SOCIAL SERVICES AND WELFARE POLICY V. 2 TO 4 HOURS. Continues Social Work 474. Prerequisite: SocW 474.

476. ADMINISTRATION IN SOCIAL WORK. 2 TO 4 HOURS. Principles, concepts, and processes. Special emphasis on leadership, policy and decision-making, planning, and program organization.

480. PROSEMINAR ON SOCIAL WORK. 2 TO 4 HOURS. May be repeated with the consent of the instructor. Analysis and critique of the current state of knowledge, research, and trends in selected areas of social work theory and practice, including social treatment and social planning. Stress is on selected recent developments and the potentialities for significant study and innovation. Prerequisite: Admission to the program for the Doctor of Social Work.

490. EVALUATIVE RESEARCH ON SOCIAL SERVICES EFFECTIVENESS. 4 HOURS. Review and assessment of empirical research on the results of social service intervention; concepts, criteria, and methodology of such research; the state of knowledge concerning effectiveness of social services and areas of further inquiry; the application of theory and research tools from allied disciplines. Prerequisite: SocW 494.

493. SOCIAL RESEARCH I. 2 TO 4 HOURS. Objectives of social research, design of experiments, and measurement and methods of collecting data.

494.   SOCIAL RESEARCH II. 2 TO 4 HOURS. Continues Social Work 493. Design of questionnaires and schedules; methods of data analysis, including statistical hypothesis testing and applications of inferential techniques; interpretation of results; preparation of the report; review of selected studies. Prerequisite: SocW 493.

495.   RESEARCH SEMINAR: SOCIAL SERVICE ISSUES. 2 TO 4 HOURS. Methodologies and results of research in selected fields and methods of social services; special issues and problems in practice; relationship of research, theory, and practice; priorities for future research. Prerequisite: SocW 494.

496.   RESEARCH SEMINAR: SOCIAL WELFARE MANPOWER DEVELOPMENT AND UTILIZATION. 2 TO 4 HOURS. The social welfare manpower system and the demand, supply, and utilization of subsystems. Recruitment, organization, function, development, and evaluation of staff and the concepts of professionalization and new careers. Review of empirical research, agency experience, conceptual models, and manpower planning efforts. Prerequisites: SocW 433, 473, 494.

497.   RESEARCH SEMINAR: METHODOLOGIES IN SOCIAL WORK RESEARCH. 2 TO 4 HOURS. Selected research techniques; assessment, application, innovation. Systems analysis; social indicators; planning, programming, and budgeting systems; cost-benefit analysis; evaluative research; case analysis methods; cybernetics; information systems. Prerequisite: SocW 494.

498.   RESEARCH PROJECT. 0 TO 12 HOURS. Application of research methods to a social work problem in an individual or group project or a library research project conducted by an individual student. Preparation of a formal report based on field study processes and findings. Prerequisite: SocW 494.

499.   THESIS RESEARCH. 0 TO 16 HOURS. Individual research, under faculty direction, on social work problems. Prerequisites: SocW 494 or the equivalent and consent of the thesis adviser.

SOCIOLOGY

Professors: David B. Carpenter, Head of the Department; Bernard H. Baum, M. Rue Bucher, James T. Carey, Robert E. Corley, Robert L. Hall, John W.C. Johnstone, Roger W. Little, Mildred A. Schwartz, Ethel Shanas

Associate Professors: Pauline B. Bart, Kathleen S. Crittenden, William W. Erbe, John W. Martin

Assistant Professors: Janet M. Alger, Steven F. Alger, Daniel J. Amick, Calvin Bradford, R. Michael Buren, Butler P. Crittenden, Phyllis A. Ewer, Hazel S. Fisher, Helen R. Miller, James L. Norr, Gerald M. Swatez, Larry Tifft, Mary Glenn Wiley

The Department of Sociology offers work leading to the Master of Arts and the Doctor of Philosophy.

The program for the Master of Arts is in general sociology; it provides basic familiarity with the concepts, techniques, and substance of three broad subfields—social organization, social psychology, and demography and human ecology.

Admission Requirements

Work in logic, philosophy of science, mathematics, and statistics as well as sociology is strongly recommended. Admission preference is given to students who have completed such work.

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study. In exceptional cases, students who have averages of less than 4.00 but above 3.75 or who do not have a strong undergraduate preparation in sociology may be admitted if they can show evidence of substantial promise of ability to complete the program successfully. Such students may be admitted on limited status and will be required to remedy department deficiencies before being admitted to regular status.

Submission of scores from the Graduate Record Examination (verbal and quantitative test and the advanced test in sociology) is required. The advanced test in sociology is used as an aid in advising students but is not a factor in admission.

Students who have completed some graduate study elsewhere, in addition to the above requirements, must offer a grade point average of at least 4.50 in previous graduate study.

Degree Requirements

Master of Arts

Hours. 48 quarter hours, including 12 hours in Sociology 400, 401, 402—Theory and Method in Sociology; 8 hours in seminars at the 400 level; and either Sociology 300 or 301.

Comprehensive Examination. A candidate must satisfactorily complete a comprehensive examination.

Thesis. A thesis is not required.

Doctor of Philosophy

Hours. 144 quarter hours beyond the bachelor's degree or 96 hours beyond the master's degree.

In addition to satisfying the general requirements of the Graduate College, students must complete graduate courses, selected in consultation with the student's major adviser, that include Sociology 400, 401, and 402 and 16 hours in sociology seminars at the 400 level (beyond the bachelor's degree) and may include 24 hours of courses outside of sociology if the adviser approves. The student must successfully complete a qualifying examination in general sociology, given at the discretion of the department, and a preliminary examination in his area of specialization. A PhD candidate must present evidence acceptable to his examining committee that he: (a) has had supervised experience in empirical research, including the use of more than one major technique of research; (b) has had successful experience in the

clear presentation of sociological materials to students; and (c) has knowledge of statistics at least equivalent to that available in Sociology 302.

Thesis. Candidates must prepare a dissertation based upon empirical research.

Courses for Graduate and Advanced Undergraduate Students

300. EXPLORATORY SOCIAL DATA ANALYSIS. 4 HOURS. 3 hours of lecture-discussion, 2 hours of laboratory per week. Introduction to the analysis of social data; relationship between data analysis and measurement operations; transformations of data; construction of indices; graphic display of data; analysis and interpretation of residuals. Prerequisites: Soc 201 and 8 hours of upper-division sociology.

301. SOCIOLOGICAL STATISTICS. 4 HOURS. 3 hours of lecture, 2 hours of laboratory per week. Intended primarily for graduate students and advanced undergraduate sociology majors. Introduction to statistical tests of sociological hypotheses; estimation procedures; selected statistical procedures commonly used in sociology. Prerequisite: Graduate or upper-division standing.

302. ADVANCED STATISTICS IN SOCIOLOGY. 4 HOURS. Analysis of contingency tables; multiple and partial, linear and nonlinear correlation; analysis of variance. Prerequisite: Soc 301.

305. RESEARCH TECHNIQUES IN SOCIOLOGY. 4 HOURS. 3 hours of lecture-discussion, 2 hours of laboratory per week. Several common techniques of collecting and organizing sociological data, such as questionnaires and interview schedules, systematic observation, scaling, nonreactive measures, content analysis. Prerequisites: 8 hours of upper-division sociology and consent of the instructor.

306. RESEARCH DESIGN IN SOCIOLOGY. 4 HOURS. Formulation of researchable problems; designing procedures and selecting techniques to fit particular objectives; planning controls to distinguish among alternative hypotheses. Prerequisite: Soc 301.

314. SOCIAL PSYCHOLOGY OF ORGANIZATIONS. 4 HOURS. Sociological analysis of the mutual influence of individuals and social organizations through such organizational processes as recruitment, socialization, interaction, innovation, and social control. The entire range of social organizations is considered, such as polities, social movements, communities, bureaucracies, families, gangs, friendships, encounters. Prerequisites: Soc 110 or 210 and 8 hours of upper-division sociology.

316. ADULT SOCIALIZATION. 4 HOURS. Socialization as a process of induction into new roles, which occurs throughout the life cycle; the process is analyzed at both social-psychological and social-systems levels with illustrations from various settings, such as marriage and family, illness, migration, and particularly socialization into occupations and professions. Prerequisite: 8 hours of sociology at the 200 and 300 level.

318. SOCIOLOGY OF LITERATURE. 4 HOURS. How literature is influenced by and in turn influences social forces; effects of social class, political and economic factors, and religious, ethnic, and racial affiliations on literary works; attitudes of writers, relationships to publics, reward systems, and related matters. Prerequisites: 8 hours of upper-division sociology and 6 hours of literature (any department).

319.   TOPICS IN SOCIAL PSYCHOLOGY. 4 HOURS. May be repeated for up to 12 hours of credit. Intensive analysis of a specialized topic, announced at the time the class is scheduled. Prerequisites: Soc 110 or 210 and 8 hours of upper-division sociology.

325.   AGE GROUPS AND THE SOCIAL ORDER. 4 HOURS. The relation of age groups to social structure; the demographic, sociological, and social-psychological conditions affecting the salience of age as a basis of social organization; recent writings on adolescents and youth; relations between generations; current directions in the study of youth groups, both conventional and deviant. Prerequisite: 4 hours of upper-division sociology.

333.   SOCIOLOGY OF LAW. 4 HOURS. Same as Criminal Justice 333. The origin and development of legal norms in various social settings; their relationship to custom and incorporation in legal and quasi-legal institutions; special attention to the difference between legal and sociological reasoning; law as an instrument of social change. Prerequisite: 8 hours of upper-division sociology, including Soc 230.

335.   TOPICS IN DEVIANCE AND SOCIAL CONTROL. 4 HOURS. May be repeated for up to 12 hours of credit. Intensive analysis of a specialized topic in the sociology of law, deviance, and social control. Each topic is announced at the time the class is scheduled. Prerequisite: 8 hours of upper-division sociology, including Soc 230.

341.   SOCIAL STRATIFICATION AND CLASSES. 4 HOURS. Nature and systems of differentiation and ranking in societies, emphasis on the class structure in the United States; life chances, prestige, status, power, and social mobility in the United States and other societies. Prerequisite: 8 hours of upper-division sociology.

343.   TOPICS IN THE SOCIOLOGY OF EDUCATION. 4 HOURS. May be repeated for credit up to a total of 12 hours. Intensive examination of a specialized topic, announced each time the course is scheduled. Prerequisites: 8 hours of upper-division sociology and consent of the instructor.

344.   INDUSTRIAL SOCIOLOGY. 4 HOURS. Analysis of industrial institutions in contemporary society; management, labor, and the community. Prerequisite: 8 hours of sociology.

345.   THE SOCIOLOGY OF THE FAMILY. 4 HOURS. The family as a social institution; its functions and forms in contemporary society. Prerequisite: 8 hours of sociology.

346.   SOCIOLOGY OF SCIENCE. 4 HOURS. Organization of the scientific enterprise; emergence of science as a social institution; interrelations with other institutions, such as government, religion, economy, and the arts. Science as a social phenomenon; regularities in scientific behavior; historical and contemporary material. Prerequisite: 8 hours of sociology.

347.   SOCIOLOGY OF COMPLEX ORGANIZATIONS. 4 HOURS. Characteristics of business, government agencies, schools, hospitals, and other large-scale organizations, approaches used to study organizations, and theoretical and empirical analysis of organizational processes. Prerequisites: Senior standing and 8 hours of sociology.

348.   TOPICS IN THE SOCIOLOGY OF WAR. 4 HOURS. May be repeated for up to 12 hours of credit. Intensive analysis of selected topics, including comparative military organization, the relationships between military institutions and other institutions of the larger society, their roles in social conflict and change. Prerequisites: Soc 100 and 12 hours of either sociology, political science, history, or economics.

349.   SOCIOLOGY OF OCCUPATIONS AND PROFESSIONS. 4 HOURS. Theoretical and empirical analysis of the occupational structure and occupational mobility processes in American and other industrial societies; patterns of recruitment and retention in occupations and professions. Prerequisite: Soc 203.

351.   MEDICAL SOCIOLOGY. 4 HOURS. Same as Urban Planning and Policy 351. Sociological contributions to medicine and public health; social organization and the organization of health services; the sociology of illness. Prerequisite: 8 hours of upper-division sociology.

352.   SOCIAL EPIDEMIOLOGY: SOCIAL AND CULTURAL FACTORS IN HEALTH AND DISEASE. 4 HOURS. The methods of social epidemiology as they apply to chronic and acute disease; psychosocial factors in illness; individual and social reactions to health and disease. Prerequisite: 8 hours of upper-division sociology.

353.   HEALTH CARE SYSTEMS. 4 HOURS. The organization of medical care in the United States and other selected countries. Methods of delivering medical care to various populations; emphasis on urban medicine. Prerequisite: 8 hours of upper-division sociology.

354.   URBAN MEDICINE. 2 HOURS. Same as Preventive Medicine and Community Health 399B (College of Medicine). A combination of preceptorship and seminar-discussion for advanced clinical students; several models of the urban health care setting are examined by direct participation; seminar topics evaluate the nature of and factors contributing to each of the study models; critical observation and evaluation of special-interest areas, such as private practice, group practice, private hospital, public hospital, health department and public health programs, health care plans, neighborhood health centers, and others as student interest dictates. Prerequisite: Consent of the instructor.

355.   TOPICS IN MEDICAL SOCIOLOGY. 4 HOURS. May be repeated for up to 12 hours of credit. Intensive analysis of the methods and literature in a selected subfield of medical sociology. Each topic is announced at the time the class is scheduled. Prerequisites: Soc 351 and consent of the instructor.

357.   FIELD EXPERIENCE IN MEDICAL SOCIOLOGY. 2 TO 12 HOURS. Field placement in a medical institution for sociology students. Critical observation and the application of sociological concepts in the study of special-interest areas, such as the role of the patient, patient-doctor relationship, and socialization into the health professions. Prerequisites: 12 hours of upper-division sociology, including Soc 351 or 352 or 353 and consent of the instructor.

361.   SOCIAL GERONTOLOGY: OLD PEOPLE IN AMERICA. 4 HOURS. The aged: demographic trends, economic status, physical and social needs, family relationships. Prerequisite: 8 hours of upper-division sociology.

365.   TOPICS IN THE SOCIOLOGY OF POLITICS. 4 HOURS. May be repeated for up to 12 hours of credit. Intensive analysis of a specialized topic concerning the sociological study of politics. Each topic is announced at the time the class is

scheduled. Prerequisites: 8 hours of upper-division sociology and consent of the instructor. Sociology 265 is recommended.

366.   COMMUNITY POWER STRUCTURE. 4 HOURS. Analysis of the power structure of American communities; special emphasis on the relation between theoretical assumptions and research procedures in current community studies. Prerequisite: 12 hours of sociology.

371.   POPULATION I. 4 HOURS. 2 hours of lecture, 2 hours of laboratory-discussion per week. Primarily for sociology majors and graduate students. The measurement and study of major trends and differentials in fertility, mortality, population growth, and age-sex composition in the United States and other countries. Emphasis on social and cultural determinants and consequences. Prerequisite: 12 hours of sociology, including Soc 201 or the equivalent.

372.   POPULATION II. 4 HOURS. 2 hours of lecture, 2 hours of laboratory-discussion per week. The measurement and study of major trends in migration, population composition, and marriage and divorce in the United States and other countries; theories and policies regarding population growth in relation to resources; population forecasting. Prerequisite: Soc 371.

373.   HUMAN ECOLOGY. 4 HOURS. The relationship between man and the natural environment. Emphasis on importance of population patterns and human institutions in adaptation. Prerequisite: 12 hours of sociology, including Soc 201 or the equivalent.

375.   TOPICS IN POPULATION AND HUMAN ECOLOGY. 4 HOURS. May be repeated for up to 12 hours of credit. Intensive analysis of a specialized topic on population or human ecology, announced at the time the class is scheduled. Prerequisites: 8 hours of upper-division sociology and consent of the instructor.

376.   TOPICS IN URBAN SOCIOLOGY. 4 HOURS. May be repeated for up to 12 hours of credit. Intensive analysis of a specialized topic, announced at the time the class is scheduled. Prerequisites: 8 hours of upper-division sociology and consent of the instructor.

381.   TOPICS IN SOCIAL CHANGE. 4 HOURS. May be repeated for up to 12 hours of credit. Intensive analysis of a specialized topic on processes of social change, announced at the time the class is scheduled. Prerequisites: 8 hours of upper-division sociology and consent of the instructor.

384.   TOPICS IN SOCIOLOGICAL THEORY CONSTRUCTION. 4 HOURS. May be repeated for up to 12 hours of credit. Intensive analysis of various contemporary topics. Prerequisite: Soc 202.

385.   HISTORY OF EUROPEAN SOCIOLOGICAL THEORY. 4 HOURS. European foundations of modern sociology from the French Revolution through the aftermath of World War I, with emphasis on selected European theorists who have had a strong impact on modern sociology. Their works are viewed both analytically and historically. Prerequisite: 8 hours of upper-division sociology.

386.   HISTORY OF AMERICAN SOCIOLOGICAL THEORY. 4 HOURS. American foundations of modern sociology from the Civil War to World War II, with emphasis on selected American theorists who have had a strong impact on contemporary sociology. Their works are viewed both analytically and historically. Prerequisite: 8 hours of upper-division sociology.

387. CONTEMPORARY SOCIOLOGICAL THEORY. 4 HOURS. Issues and thinkers associated with the development of sociological theory since World War II, presented analytically and in terms of the social context in which it was written. Stress on the implications of this recent work for future research. Prerequisite: 8 hours of upper-division sociology.

389. INDEPENDENT STUDY. 2 TO 12 HOURS. Supervised study projects for graduate students and honors undergraduates; may consist of extensive readings in specialized areas of sociology or empirical research; exclusive of credit given under Sociology 499. Prerequisites: Soc 203, 20 hours of sociology, and approval of the department.

395. TOPICS IN SOCIAL ORGANIZATIONS AND INSTITUTIONS. 4 HOURS. May be repeated for up to a total of 12 hours of credit. Intensive analysis of a specialized topic. Prerequisites: 8 hours of upper-division sociology and consent of the instructor.

Courses for Graduate Students

400. THEORY AND METHOD IN SOCIOLOGY. 4 HOURS. Required of all graduate majors. Detailed examination of middle-range theories, such as compliant behavior, status congruence, and intervening opportunities in migration; the means of bringing evidence to bear on them. Emphasis on the link between theoretical assertions and data. May be taken out of sequence with the consent of the instructor. Prerequisite: Consent of the instructor.

401. THEORY AND METHOD IN SOCIOLOGY. 4 HOURS. Required of all graduate majors. Continues Sociology 400. May be taken out of sequence with the consent of the instructor. Prerequisite: Soc 400.

402. THEORY AND METHOD IN SOCIOLOGY. 4 HOURS. Required of all graduate majors. Continues Sociology 400 and 401. May be taken out of sequence with the consent of the instructor. Prerequisite: Soc 401.

404. RESEARCH METHODS PRACTICUM. 2 TO 6 HOURS. May be repeated with the approval of the department. Supervised experience in the use of specialized techniques of sociological research. The topic is announced when the class is scheduled. The practicum is usually offered in a three-quarter sequence. Prerequisite: Consent of the instructor.

409. SEMINAR: SOCIOLOGICAL RESEARCH METHODS. 2 TO 6 HOURS. May be repeated for credit up to a total of 16 hours. Intensive analysis of specialized topics. Prerequisite: Consent of the instructor.

411. SMALL GROUPS: STRUCTURE AND PROCESS. 4 HOURS. Same as Psychology 411. Systematic survey of research and theory dealing with social interaction and social relationships in small groups; primary groups as agents of social influence and social control. Prerequisite: Consent of the instructor.

419. SEMINAR: SOCIAL PSYCHOLOGY. 2 TO 6 HOURS. May be repeated for credit up to a total of 16 hours. Intensive analysis of special topics. Prerequisite: Consent of the instructor.

429. SEMINAR: SOCIOLOGICAL THEORY. 2 TO 6 HOURS. May be repeated for credit up to a total of 16 hours. Intensive analysis of specialized topics. Prerequisite: Consent of the instructor.

439. SEMINAR: DEVIANCE AND SOCIAL CONTROL. 2 TO 6 HOURS. May be repeated for credit up to a total of 16 hours. Intensive analysis of specialized topics. Prerequisite: Consent of the instructor.

449. SEMINAR ON SOCIAL ORGANIZATION. 2 TO 6 HOURS. May be repeated for credit up to a total of 16 hours. Intensive analysis of specialized topics. Prerequisite: Consent of the instructor.

459. SEMINAR: SOCIOLOGY OF MEDICINE. 2 TO 6 HOURS. May be repeated for credit up to a total of 16 hours. Intensive analysis of special topics. Prerequisite: Consent of the instructor.

469. SEMINAR: SOCIOLOGY OF POLITICS. 2 TO 6 HOURS. May be repeated for credit up to a total of 16 hours. Intensive analysis of special topics. Prerequisite: Consent of the instructor.

476. SEMINAR: SOCIOLOGY OF URBAN LIFE. 2 TO 6 HOURS. May be repeated for credit up to a total of 16 hours. Intensive analysis of specialized topics. Prerequisite: Graduate standing in sociology.

479. SEMINAR: POPULATION AND HUMAN ECOLOGY. 2 TO 6 HOURS. May be repeated for credit up to a total of 16 hours. Intensive analysis of special topics. Prerequisite: Consent of the instructor.

489. SEMINAR: SOCIAL INSTITUTIONS. 2 TO 6 HOURS. May be repeated for credit up to a total of 16 hours. Intensive analysis of specialized topics. Prerequisite: Consent of the instructor.

490. COLLOQUIUM ON COLLEGE TEACHING OF SOCIOLOGY. 4 HOURS. Sociological analysis of contemporary university teaching; specific information and techniques for the presentation of sociology at the college level. Prerequisite: One quarter of graduate study.

498. SUPERVISED RESEARCH IN SOCIOLOGY. 2 TO 8 HOURS. May be repeated for credit. Research on special problems not included in a graduate thesis. Prerequisites: Consent of the instructor and approval of the department.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit.

SPANISH

Professors: Brian Dutton, Head of the Department; Eduardo Betoret-Paris, Audrey Kouvel, José Sánchez

Associate Professors: Violet B. Bergquist, Manuel Blanco-Gonzalez, Ruth El Saffar, Klaus Mueller-Bergh

Assistant Professors: Lucille V. Braun, James D. Compton, Margherita M. Harwell, Jerry Rank, Henry W. Sullivan

The department offers an MA in Spanish-American culture and literature and an intercampus program with the Urbana-Champaign campus of the University of Illinois leading to an MA in Spanish. Three areas of

specialization are offered in the intercampus program: applied linguistics and teaching, Latin American studies, and peninsular studies.

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or unversity and a grade point average of at least 3.75 (A=5.00) for the final 90 quarter hours (60 semester hours) of study, preferably with a grade point average of at least 4.00 in major Spanish courses. In exceptional cases, students who have averages of less than 3.75 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully.

Applicants must demonstrate fluency and accuracy in spoken and written Spanish.

Degree Requirements

The student is required to maintain a 4.00 (B) average and to complete successfully:

1. *Qualifying Examination*—Given at the end of each quarter, this examination must be passed by the end of the first year of study in order that a student may be recommended for either MA program. Until the qualifying examination is passed, the candidate has limited status. The qualifying examination may be attempted twice.
2. *Final Comprehensive Examinations*—These are normally taken immediately after the completion of course work and may be attempted twice.

MA in Spanish-American Culture and Literature

This program is administered by a committee appointed by the Dean of the Graduate College. Each student will be assigned an adviser to draw up an approved plan of work to be filed with the Graduate College.

Credit Distribution. A minimum of 56 quarter hours is required, distributed as follows:

A. *Ethnic Studies.* A basic core sequence of two 4-hour credit courses (totaling 8 quarter hours) offered by the Department of Sociology.
B. *Spanish-American History or Political Science.* A choice of two 4-hour credit courses (totaling 8 quarter hours) offered by the Department of History or Political Science.
C. *Spanish-American Literature and Culture.* Five 4-hour credit courses (totaling 20 quarter hours) at the 300 and 400 levels.
D. *Electives.* Five 4-hour credit courses (totaling 20 quarter hours) at the 300 and 400 levels chosen from A, B, or C above.

MA in Spanish (Intercampus Program)

A minimum of 48 quarter hours is required; at least 20 quarter hours of course work must be at the 400 level, including one of the colloquia, Spanish 401, 402, 404, and one Spanish 400-level seminar.

A thesis is not required.

Courses for Graduate and Advanced Undergraduate Students

301. CONTEMPORARY SPANISH POETRY. 4 HOURS. From modernism to the present. Readings and interpretation of the works of some of the best known poets of the period. Prerequisite: Span 291 or 221.

302. CONTEMPORARY SPANISH THEATER. 4 HOURS. Plays of some of the best known contemporary authors, from Benavente to Sastre. Prerequisite: Span 219 or 221.

303. NINETEENTH-CENTURY SPANISH NON-ROMANTIC DRAMA. 4 HOURS. Representative outlines of non-Romantic plays, their characteristics and development. Prerequisite: Span 219 or 221.

305. SPANISH ROMANTICISM. 4 HOURS. Representative works of the Romantic period; particular emphasis on Romantic drama and poetry. Prerequisite: Span 219 or 221.

306. REALISM IN NINETEENTH-CENTURY SPANISH LITERATURE. 4 HOURS. Continues Spanish 305. Prerequisite: Span 219 or 221.

307. THE GENERATION OF 1898. 4 HOURS. Representative works of Baroja, Azorín, Unamuno, Maeztu, Valle Inclán, Benavente, A. Machado, and others. Prerequisite: Span 219 or 221.

308. SPANISH-AMERICAN LITERATURE TO 1888 I. 4 HOURS. Same as Latin American Studies 308. Development from the sixteenth century through the end of the Romantic period. Prerequisite: Span 223 or 224 or the equivalent.

309. SPANISH-AMERICAN LITERATURE TO 1888 II. 4 HOURS. Same as Latin American Studies 309. Continues Spanish 308. Prerequisite: Span 223 or 224.

310. *MODERNISMO* AND CONTEMPORARY SPANISH-AMERICAN POETRY I. 4 HOURS. Same as Latin American Studies 310. Spanish-American poetry from 1888 to the present with some *Modernista* prose. Prerequisite: Span 223 or 224.

311. *MODERNISMO* AND CONTEMPORARY SPANISH-AMERICAN POETRY II. 4 HOURS. Same as Latin American Studies 311. Continues Spanish 310. Prerequisite: Span 223 or 224.

314. POETRY OF THE GOLDEN AGE. 4 HOURS. The development of Spanish lyric poetry out of both popular and classical sources. *Romances,* Renaissance poetry, mystic poetry, *culteranismo,* and *conceptismo.* Prerequisite: Span 218.

315. DRAMA OF THE GOLDEN AGE. 4 HOURS. Development of Spanish theater in the Golden Age; detailed study of plays by Lope de Vega, Tirso de Molina, Calderón, and other representative dramatists. Prerequisite: Span 218.

316. THE SPANISH PICARESQUE NOVEL. 4 HOURS. The major Spanish works in the picaresque tradition; emphasis on the origins of this literary development and the changes it underwent during the one hundred years of its flowering. Prerequisite: Span 218.

317. PROSE OF THE GOLDEN AGE. 4 HOURS. Major examples of picaresque, pastoral, and chivalric forms. Prerequisite: Span 218.

318. MINOR WORKS OF CERVANTES. 4 HOURS. The prose of Cervantes and its relationship to his masterpiece. Prerequisite: Span 218.

319. *DON QUIJOTE.* 4 HOURS. Same as Humanities 319. Reading and discussion; emphasis on novelistic technique and the development of the novel. Prerequisite: Junior standing.

320. THE CONTEMPORARY SPANISH NOVEL I. 4 HOURS. Development since 1936. Prerequisite: Span 219 or 221.

321. THE CONTEMPORARY SPANISH NOVEL II. 4 HOURS. Continues Spanish 320. Prerequisite: Span 219 or 221.

322. REGIONALISM AND POPULARISM IN THE SPANISH NOVEL. 4 HOURS. Origins, development, characteristics, and significance of regionalism-popularism in Spanish literature and its relation to Spanish regions. Prerequisite: Span 219.

323. THE CONTEMPORARY SPANISH-AMERICAN NOVEL I. 4 HOURS. Same as Latin American Studies 323. From the Romantic period to 1930. Prerequisite: Span 223 or 224 or the equivalent.

324. THE CONTEMPORARY SPANISH-AMERICAN NOVEL II. 4 HOURS. Same as Latin American Studies 324. Continues Spanish 323. From 1930 to the present. Prerequisite: Span 233 or 224.

334. THE NOVEL OF THE MEXICAN REVOLUTION. 4 HOURS. The major works of Mariano Azuela, Martin Luis Guzmán, José Ruben Romero, and other writers of fiction. Prerequisite: Span 224.

335. THE INDIGENIST NOVEL IN LATIN AMERICA. 4 HOURS. Survey of one of the important developments in the Latin American social novel; emphasis on the novel of the Andean region (Peru, Bolivia, and Ecuador). Prerequisite: Span 244.

336. EXPERIMENTAL SPANISH-AMERICAN FICTION. 4 HOURS. Contemporary fiction, emphasis on the latest developments in the novel and short story. Prerequisite: Span 244.

340. HISTORY OF THE SPANISH LANGUAGE. 4 HOURS. General survey of the development of the Spanish language. Prerequisite: Consent of the instructor.

341. STUDIES IN PENINSULAR LANGUAGES. 4 HOURS. May be repeated for credit. Dialects and languages of the Iberian Peninsula, including Catalan, Galician, Aragonese, Leonese. Topic varies from quarter to quarter. Prerequisite: Span 340 or an equivalent course in any Romance language or approval of the department.

342. INTRODUCTION TO ROMANCE PHILOLOGY. 4 HOURS. History of the Romance languages, especially Spanish, French, Italian, and Portuguese, from the classical Latin period to the present; their external history, phonology, morphology, and syntax. Prerequisite: Consent of the instructor.

345. MEDIEVAL SPANISH LITERATURE I. 4 HOURS. Important works from the beginnings to 1400. Prerequisite: Span 218. Spanish 340 is recommended.

346. MEDIEVAL SPANISH LITERATURE II. 4 HOURS. Important works of the fifteenth century. Prerequisite: Span 218. Spanish 340 is recommended.

349.   PHONETICS. 4 HOURS. Prerequisites: Span 213, and 218 or 221.

361.   SPANISH ABROAD. 0 TO 15 HOURS. May be repeated for credit for a maximum of 45 hours. Lectures, seminars, and practical work in Spain. Spanish language, literature, and civilization. Prerequisites: Span 214 or the equivalent; Span 218, 219 or the equivalents; 3.50 overall average; 4.00 average in Spanish courses.

371.   SPANISH FOR TEACHERS. 4 HOURS. Consideration of those language problems suggested by teaching experience. It is recommended that this course be taken after student teaching, in the last quarter before graduation. Also open to experienced teachers. Prerequisite: Student teaching or professional teaching experience.

390.   TOPICS IN SPANISH LITERATURE. 6 HOURS. May be repeated. Topics vary from quarter to quarter. Prerequisite: Consent of the instructor.

399.   INDEPENDENT STUDY. 1 TO 6 HOURS. Supervised study, in an area not covered by regularly offered courses, under the direction of a faculty member designated by the department on the request of a qualified student. Individual conferences, assigned readings and papers, and other work are required. Prerequisites: Spanish major with senior standing or graduate student in Spanish and approval of the department.

Courses for Graduate Students

401.   APPLIED LINGUISTICS AND LANGUAGE TRAINING IN SPANISH, ITALIAN, AND PORTUGUESE. 4 HOURS. Systems of linguistic analysis in relation to language teaching via programmed instruction, audio-visual aids, TV, radio, and computer-based instruction. Practical work is required in problem areas. Prerequisite: Fluency in a Romance language.

402.   INTRODUCTION TO LATIN AMERICAN STUDIES. 4 HOURS. Problems inherent in the concept of Latin American studies; national versus regional and Continental values; indigenous, *mestizo,* and *criollo* versus European; *hispanidad* in Latin America and the effects of non-Spanish immigration and cultural influences. Prerequisite: Consent of the instructor.

404.   INTELLECTUAL HISTORY OF SPANISH CULTURE. 4 HOURS. The major intellectual and social movements in relation to the Spanish culture. Such topics as feudalism, honor, courtly love, humanism, and the baroque are discussed, and their Spanish manifestations are investigated. The course centers on the origins and early growth of movements.

405.   SPANISH LITERATURE OF THE EIGHTEENTH AND NINETEENTH CENTURIES. 4 HOURS. The beginnings of eighteenth-century rationalism; neo-classicism and French influence; the *sainetes* of Ramón de la Cruz; the nationalistic reaction against France during the Napoleonic Wars; liberalism and Romanticism; the *costumbrista* movement; the growth of realism and naturalism; the concern of the novel with social and religious issues; the precursors of 1898. Prerequisite: Any two of Span 302, 305, 306 or the equivalent.

407.   SPANISH LITERATURE OF THE TWENTIETH CENTURY. 4 HOURS. May be repeated twice. The generation of 1898, modernism and postmodernism, the development of non-engagé literature, popularism, the Civil War and its literary consequences, the writings of the "new" Spain of the 1950s and 1960s. Prerequisites: Span 301 and 307.

409. SPANISH LITERATURE OF THE GOLDEN AGE. 4 HOURS. May be repeated twice. Renaissance and humanistic influences, the discovery of America, the Counterreformation, the baroque, *conceptismo* and *culteranismo* as elements in the development of Spanish thought and letters in the period of 1500 to 1700. Topics vary. Prerequisite: Span 314 or 315.

411. SPANISH LITERATURE BEFORE 1500. 4 HOURS. May be repeated twice. The growth of medieval vernacular culture, the rise of secularism, the development of a reading public, and the social changes these movements reflect. The break-up of feudalism, the changing nature of the nobility, the growth of courtly love, feminism versus antifeminism, the emergence of the bourgeoisie, the "two cultures" of the pen and the sword, and similar topics. Prerequisite: Consent of the instructor.

413. LATIN AMERICAN LITERATURE. 4 HOURS. The Caribbean Mexico, and Central America. Reading and discussion of major literary movements, individual works, and such literary figures as Sor Juana, Galván, Hostos, Martí, Varona, Darío, Azuela, Guzmán, Asturias, Yañez, Fuentes, Reyes, Rulfo, Marqués, Bosch, and others.

425. SEMINAR: SPANISH LITERATURE OF THE TWENTIETH CENTURY. 6 HOURS. May be repeated for credit twice. An in-depth study of one of the major figures of twentieth-century Spanish literature. Topics vary. Prerequisite: Consent of the instructor and of the graduate committee chairman.

436. SEMINAR ON LATIN AMERICAN LITERATURE. 4 HOURS. A monographic study of one of the major figures of the colonial period or the nineteenth or twentieth century. Prerequisites: Span 224 and one 300-level course in Latin American literature.

440. THE SPANISH RENAISSANCE. 6 HOURS. Social, cultural, and intellectual characteristics; main periods and aspects in relation to typical authors and works from 1450 to 1600. Prerequisite: At least two courses from Span 314, 315, 317, 318, 319, 345, 346.

445. SEMINAR ON SPANISH LITERATURE OF THE GOLDEN AGE. 6 HOURS. May be repeated twice. Monographic studies on the major figures of the Spanish Golden Age. Topics vary. Prerequisite: Approval of the department.

490. SPECIAL SEMINAR. 6 HOURS. Topics varies. Prerequisite: Two 300-level courses in Spanish or approval of the department.

491. INDEPENDENT STUDY. 1 TO 6 HOURS. May be repeated for credit. Available only after 18 hours of graduate credit. Study, under a graduate faculty member, of an area not otherwise available. Prerequisite: Consent of the graduate chairman.

499. THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit. Individual work under the supervision of a graduate faculty member. Prerequisite: Approval of the department graduate committee.

SPEECH AND THEATER

Professors: R. Victor Harnack, Head of the Department; Donald H. Dickinson, Grace Holt, Chester C. Long, Harry J. Skornia.

Associate Professors: Thomas Kochman, Katharine Loesch, Natalie Schmitt, Barbara Wood

Assistant Professors: John Dimmick, John A. Jones, Joel Sternberg

Admission Requirements

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university, a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study, and the equivalent of 30 quarter hours of study in speech and theater. In exceptional cases, students who have averages below 4.00 but above 3.50, or fewer than 30 quarter hours of work in speech and theater, may be admitted if they can show evidence of substantial promise of ability to complete the program successfully.

Degree Requirements

A thesis and its oral defense are required for the degree. A minimum of 48 quarter hours, including Speech 397 and at least 16 hours at the 400 level, must also be presented. Of these 48 hours, at least 36, including thesis credit (6 to 12 hours), must be in speech and theater; the remaining 12 must be either in speech or in approved courses in other departments.

Courses for Graduate and Advanced Undergraduate Students

301. COMMUNICATION ANALYSIS. 4 HOURS. Descriptions, models, proposed dimensions, and statistical treatment of the communication process. Prerequisites: Spch 112, 113, 201 or 202, and 210.

302. GROUP COMMUNICATION THEORY. 4 HOURS. Detailed analysis and observation of group processes from the viewpoint of modern information and field communication theory. Prerequisites: Spch 111, 112, 113, 210, and 211.

303. THEORIES OF LANGUAGE PERFORMANCE. 4 HOURS. Contemporary theories and related research in language performance, centering upon selected approaches to language acquisition and behavior; special emphasis on the psycholinguistic approach. Prerequisites: Spch 112, 201 or 202, and 210 or the equivalent or sufficient language-linguistic background.

311. AMERICAN AND BRITISH PUBLIC ADDRESS I. 4 HOURS. Critical and historical study of American and British speakers and their speeches to 1850. Prerequisites: Spch 111, 112, 113, and any two of Spch 211, 212, 213.

312. AMERICAN AND BRITISH PUBLIC ADDRESS II. 4 HOURS. Continues Speech and Theater 311. From 1850 to 1920. Prerequisites: Spch 111, 112, 113, and any two of Spch 211, 212, 213.

313. CONTEMPORARY PUBLIC ADDRESS. 4 HOURS. Contemporary speechmaking; principal focus on issues relating to economics and government, World War II, postwar international problems, and civil rights. Prerequisites: Spch 111, 112, 113, and any two of Spch 211, 212, 213.

315. THE RHETORIC OF FREE SPEECH. 4 HOURS. The rhetorical processes employed by those speakers in the British House of Commons and in America who participated in the freedom of speech movements. Issues relating to the contemporary American scene. Prerequisites: Spch 212 and PolS 355.

321. EUROPEAN THEATER HISTORY I. 4 HOURS. Historical survey of the theater and theater arts of ancient Greece and Rome, medieval Europe, the Italian Renaissance, and Elizabethan England. Prerequisites: Spch 121 and at least 8 hours of credit from Spch 241, 251, 261, 262, 264, and 265.

322. EUROPEAN THEATER HISTORY II. 4 HOURS. Historical survey of the theater and theater arts from the seventeenth century to modern times in Europe and England. Prerequisites: Spch 122 and at least 8 hours of credit from Spch 241, 251, 261, 262, 264, and 265.

324. AMERICAN THEATER HISTORY I. 4 HOURS. Development from 1700 to 1914; historical trends and dramatic literature. Prerequisites: Spch 122 and at least 8 hours of credit from Spch 241, 261, 262, and 264.

325. AMERICAN THEATER HISTORY II. 4 HOURS. Development from 1914 to the present; native and European influences on theatrical trends. Prerequisites: Spch 122 and at least 8 hours of credit from Spch 241, 261, 262, and 264.

328. PLAY PRODUCTION PROSPECTUS. 4 HOURS. Seminar; emphasizes the stage director's central function in creating an artistic concept for producing a play and coordinating all elements of performance in an aesthetic unity. Historical research of a recognized classic and preparation of a complete production book. Prerequisites: Spch 251, 264, and 265.

329. THEATRICAL CRITICISM. 4 HOURS. Seminar on the study and practice of principally modern and contemporary criticism. Historical bases of critical judgment of play and performance; function and influence of the critic in establishing artistic standards and cultivating public taste. Preparation of criticisms of current productions. Prerequisites: Spch 122, 123, 261, and 264.

331. MASS MEDIA PROGRAMMING. 4 HOURS. Mass media program types; objectives, methods, and effects; creative development of programs from conception to script. Prerequisite: Two courses in speech, including Spch 232.

333. MASS COMMUNICATIONS. 4 HOURS. May be repeated for credit up to 8 hours. The nature of mass media in contemporary society. The legal and social responsibilities of mass media institutions in the United States and abroad. Prerequisite: Two courses in speech, including Spch 131.

334. WORLD BROADCASTING. 4 HOURS. The broadcast systems of the nations of the world; alternative and "mixed" systems; international organizations, agreements, exchanges, and problems; broadcasts to and from other countries; implications of such new developments as satellites; mass and nonmass uses. Prerequisites: Spch 113, 131, and 231.

351. SCENE DESIGN AND LIGHTING. 4 HOURS. A lecture-laboratory approach to the role of stage lighting in scene design. Analysis of historical background and sources; special emphasis on such areas as theories, psychological and aesthetic factors, and lighting application techniques and equipment. Lectures, readings, and practical problems. Prerequisite: Spch 251.

354. THE PSYCHOLOGY OF LANGUAGE. 4 HOURS. Same as Linguistics 374 and Psychology 354. Introductory survey of methods, theory, and research; the history and present status of psychology's interest in language behavior. Prerequisite: Consent of the instructor.

361. PERIODS AND STYLES OF ACTING. 4 HOURS. Concentration on premodern styles of acting: classical Greek, *commedia dell'arte,* Elizabethan, Restoration and the eighteenth century, nineteenth-century melodrama, and naturalism. Prerequisite: Spch 262.

371. ADVANCED STUDY IN LANGUAGE. NO CREDIT. Intensive study of language and speech activities of elementary school children; particular attention to those children with language disabilities. Language acquisition and applicable speech activities. Prerequisite: A baccalaureate from an accredited institution.

372. INSTRUCTIONAL APPLICATIONS OF TELEVISION AND RADIO. 4 HOURS. Television and radio as instructional communications media; the design of instructional materials relating the communications requirements of subject matter to communications capabilities of television and radio; production, utilization, and evaluation of instructional television and radio presentations. Prerequisites: Spch 131 and two courses from Spch 231, 232, 233.

374. MEDIA INTERNSHIP. 4 TO 12 HOURS. Media communication studies in a field setting. Students work in an approved professional field setting to investigate the uses of appropriate and relevant electronic media. Problem-solving approach; individual projects developed through conferences with a University faculty member and a department-selected field supervisor. Prerequisites: Spch 233; consent of the department head, obtained one quarter in advance.

375. SPEECH COMMUNICATION FIELD STUDY. 16 HOURS. Field placement with a variety of community organizations, agencies, and groups whose work is heavily dependent on effective public address and persuasive and group communication. The student is a participant-observer with emphasis on critical analysis of communication processes. Prerequisites: 16 hours of upper-division work in speech and consent of the instructor.

380. ETHNOGRAPHY OF COMMUNICATION. 4 HOURS. Social interaction viewed in terms of its context. The role of the investigator as participant-observer. The taxonomic method of description and analysis. Focus on urban contexts. Prerequisite: Spch 192.

397. PROSEMINAR ON SPEECH AND THEATER. 4 HOURS. Examination of research trends and methodologies appropriate to the area. Prerequisites: Graduate standing and 30 hours of credit in speech and theater.

Courses for Graduate Students

401. EXPERIMENTAL PSYCHOLINGUISTICS. 4 HOURS. Same as Linguistics 471 and Psychology 401. Intensive review of experimental laboratory studies

concerned with the effects of phonological, syntactic, and semantic variables on sentence perception, comprehension, production, and memory in the mature user of language. The relevance of the research in contemporary psycholinguistic theory is emphasized. Prerequisites: Spch 354 or the equivalent and consent of the instructor.

404. SEMINAR ON SPEECH AND LANGUAGE BEHAVIOR. 4 HOURS. May be repeated for credit up to 12 hours. Speech and first-language development; speech and language differences and related communicative problems within and across subcultures; recent research in speech and language mechanisms. Prerequisite: Spch 303.

407. SEMINAR ON INTERPERSONAL COMMUNICATION. 4 HOURS. Studies of problem-solving in dyadic and larger small-group structures. Prerequisite: Spch 302.

413. PROSEMINAR ON PERSUASION. 4 HOURS. May be repeated for credit up to 12 hours. Contemporary theory and research involving variables in the persuasive process. Prerequisites: Spch 210, 213, and any one of Spch 311, 312, 313, or 315.

421. SEMINAR ON THEATER HISTORY. 4 HOURS. Specialized study of selected aspects of the American theatrical scene. Prerequisites: Spch 324, 325.

422. THEORIES OF THEATER. 4 HOURS. Comparative study of the aesthetics of theater. Nature of the theatrical experience. The function and status of theater in various cultures. Emphasis on modern theories. Prerequisites: At least three courses from Spch 321, 322, 324, 325, 328, 329.

423. SPECIAL TOPICS IN CRITICISM. 4 HOURS. May be repeated for credit. Seminar on theatrical criticism. Intensive analysis of an individual critic or school or critical history of an important play; preparation of original criticism; applying existing standards and developing the student's individual approach. Prerequisite: Spch 329.

434. INTERNATIONAL COMMUNICATION. 4 HOURS. International and regional efforts, activities, organizations, and problems of the mass media (electronic, satellite, printed); propaganda, exchanges and such regional efforts and organizations as Eurovision, the Asian Broadcasting Corporation, and International Researchers and Findings. Prerequisites: Spch 334 and two courses in political science or modern world history.

439. TELEVISION AND SOCIETY. 4 HOURS. The performance of radio and television in terms of content, government and industry controls, social responsibility, economic bases, and effects. Prerequisites: Spch 131 and 8 hours from Spch 231, 232, 233, 239, 331, 333, 334.

451. THEATER ARCHITECTURE AND PRODUCTION. 4 HOURS. Seminar on aesthetic and technical problems presented by the interrelation of theater, stage, audience, and play. Field study of types of Chicago theaters and stages. Prerequisites: Spch 251, 351.

495. PROBLEMS OF TEACHING SPEECH. 4 HOURS. Seminar on teaching methods and procedures. Prerequisite: Spch 295.

498.   INDEPENDENT RESEARCH. 4 TO 8 HOURS. May be repeated for credit up to a maximum of 8 hours. Department-approved research projects not included in thesis research. Prerequisite: Consent of the head of the department.

499.   THESIS RESEARCH. 0 TO 16 HOURS. May be repeated for credit up to a maximum of 16 hours. Prerequisite: Consent of the head of the department.

URBAN PLANNING AND POLICY

Andrew L. Bavas, Director

Professors: Richard F. Babcock (Adjunct), Anthony Downs (Adjunct), Charles J. Orlebeke, Harry M. Scoble, Edwin N. Thomas, Bernard Weissbourd (Adjunct)

Associate Professors: Andrew L. Bavas (Visiting), Lenora Cartright, Michael B. Goldstein, Edward M. Levin (Adjunct), Stuart Schar, Ashish K. Sen

Assistant Professors: James N. Alexander, Calvin P. Bradford, Robert Crowson, Pierre R. deVisé (Visiting), Roger Pulliam, Clarke H.P. Schneider, April L. Young.

The College of Urban Sciences offers a seven-quarter program of professional study leading to the Master of Urban Planning and Policy. The broad goals of the program are those of the College of Urban Sciences: to educate its students to be capable of attacking contemporary urban problems; to provide multidisciplinary interaction among faculty, students, and members of the community; and to promote problem-relevant research.

The specific objectives are: (1) to train professional planners who have the general knowledge and skills required to facilitate more comprehensive planning practice and sound management, with special emphasis on allocative and administrative skills; (2) to provide specialized training in four major interrelated fields of urban planning; (3) to encourage research in urban planning and policy; and (4) to establish an accessible University-based resource for information and evaluation of community efforts directed toward resolving critical urban problems.

Students in the program may elect to specialize in any of four areas as their interest and need indicate: (1) urban policy planning; (2) health services planning; (3) education planning; and (4) community development planning (the emphasis is on social planning, community development, and social policy development). A fifth area of specialization—urban design—is being developed for introduction in spring quarter 1975. Regardless of the area selected, the structure of the overall program is such that the interrelatedness of the problems and needs in each area can be clearly recognized and considered.

The program is divided into four elements:

Core
The work of the first two quarters of the academic year consists of the core, designed to provide the student with a basic understanding of

contemporary urban policy and planning problems, urban history, urban social organization, and analytical and management skills.

Specialization

During the third, fourth, and fifth quarters, the student selects and pursues specialized in-depth study in one of the following areas: (1) urban policy planning, (2) community development planning, (3) health services planning, or (4) education planning.

Omnibus

During the sixth quarter, the student participates in an intensive multidisciplinary research seminar that emphasizes creative and qualitative synthesis of information pertinent to one or more contemporary urban problems selected by the students in the seminar, in consultation with the faculty. The intent is to provide a laboratory in which students can pool their skills and apply them to an actual planning problem.

Field Work

During the seventh and final quarter, most students are expected to complete ten weeks of professional planning experience. However, this requirement is waived for students with appropriate previous experience.

Admission Requirements

Generally, prospective students should have the ability to think and write creatively and should demonstrate the potential to identify, define, and formulate alternative solutions to problems by using appropriate methods. Further, the student should demonstrate a basic awareness of critical urban problems and issues.

Applicants are considered on an individual basis. They must have a baccalaureate from an accredited college or university and a grade point average of at least 4.00 (A=5.00) for the final 90 quarter hours (60 semester hours) of undergraduate study. In exceptional cases, students who have averages of less than 4.00 but above 3.50 may be admitted if they can show evidence of substantial promise of ability to complete the program successfully.

In addition to a completed Graduate College Application, each applicant must submit:

1. A succinct statement describing his educational and career goals, previous pertinent work, and volunteer and/or academic experience.
2. Three letters of recommendation if they have not been submitted in support of his application for a graduate appointment, such as a fellowship, an assistantship, or a tuition-and-fee waiver.
3. A recent paper, essay, or project of which the applicant is the sole author or designer. This material may be of an academic, professional, or personal nature. If the document is in written form, it should be at least 1000 words in length. It may be an extract from a larger work.

Degree Requirements

The student is required to complete 84 quarter hours, the equivalent of seven quarters of full-time graduate study. The curriculum is so designed that the student may complete it in seven consecutive quarters.

A student with demonstrated proficiency or prior professional experience may petition for exemption from one or two quarters of applied professional practice, which would enable him to complete the program in fewer than seven quarters.

A grade point average of 4.00 (A=5.00) is required for the degree. The Graduate College residency requirement of 24 quarter hours in regularly scheduled courses taken within two calendar years must also be met.

A thesis or successful completion of a comprehensive master's project equal in rigor to a thesis is a further requirement.

One quarter of field work (internship) of a professional nature is also required. This requirement is waived for the student with appropriate previous planning experience.

Focus of Specializations

Examples of the subject matter presented in the four specializations follow:

Urban Policy Planning

Model Building and Program Strategy: Various models used to represent aspects of the urban complex, urban subsystems, and urban processes are studied and tested.

Public Investment Planning: Methods and criteria for formulating long-range programs of public investment, capital budgeting, cost-benefit analysis, and social discounting.

Regional Analysis and Projection: Techniques of regional analysis, including those used for making forecasts of demographic and economic variables, are emphasized.

The Housing Environment: The several dimensions of the housing environment, such as housing as a cultural artifact, as a consumer product in an industrial society, as a social good in a humane society, and as an architectural problem, to achieve aesthetic quality and livability relative to density and to supporting community facilities.

Regional Resource Planning: Review and critical analysis of outstanding examples of planning studies developed for large regions, with stress on the complex interactions among physical, demographic, and economic resources.

Community Development

Community Development: Theory and practice of organizing and planning with locality- or community-based groups. The wide variety of models for organizing community groups is analyzed and evaluated.

Social Planning: A range of approaches to social planning, with special emphasis on their use in the development and implementation of human-services delivery.

Land Use Planning: Theory and practice of basic physical planning principles on both neighborhood and community scales. The relationship of physical planning to environmental quality is stressed.

Community Problem-Solving Analysis: Theories and practice of community development and planning are examined for use in developing models for problem-solving, with treatment and comparisons of all levels of intervention and policy development.

Social Welfare Policies and Services: Value analysis of social welfare policy, issues, and programs; the evolution of social welfare programs, legislation, and current proposed reforms; and the politics of the process of social welfare policy formulation.

Educational Policy

Problems in Educational Policy Studies: The sociological and psychological factors governing educational policy development. Interaction among students, teachers, administrators with regard to institutional and community values. An examination of local and national extra-school organizations that shape learning. The balance between school and society in the socialization process is also studied.

Alternative Educational Systems: Learning arrangements that may be alternatives to traditional schools and colleges, e.g., voucher systems, contracting-out plans, payments to employers to provide learning experiences to youths. The circumstances that stimulate such alternatives, their historic precedents, and their present and future prospects.

Educational Finance and Policy: Current and past arrangements for financing formal education at all levels. Role of local, state, and federal government, citizens, and private organizations. Developing trends and their implications.

Educational Policy and Minorities: Past and current developments affecting school policies relating to minority children, e.g., de jure and de facto segregation, desegregation, compensatory education, community control. Role of local, state, and federal agencies and community groups. Relevant research and its implications.

Health Planning

Economics of Health Care: Principles of economic theory as applied to health. Supply/demand, cost-benefit analysis, manpower and resource allocation, and others.

Structure of Health Services: Institutional structures of public and private medicine: federal, voluntary, and private systems of health care delivery. Insurance programs and third-party payment. Correlated field experience in private and public hospitals.

Health Statistics: Biostatistics and descriptive statistics. Population and disease rates, ratios, age adjustment.

Health Law: Federal, state, and municipal laws bearing on the health of the population; the regulation of health care providers and institutions; health planning, regulatory agency powers, and other pertinent activities.

Planning, Implementation, and Evaluation of Community Health Programs: Application of general planning and evaluation procedures to health programs. Correlated field study evaluation of an existing health facility or program.

Urban Design

This specialization is being developed for introduction in spring quarter 1975. Four components are planned:

Urban Design Studio I and II: Programming, site analysis, evaluation of prototypes and development strategies, design, and presentation. Renewal or new development within an existing urban context.

History of Urban Development: Emphasis on the design characteristics and the influence of socioeconomic factors, climate, and fashion.

Comprehensive Planning Procedure: Design and plan making techniques in urban planning; land use, circulation, and community facilities; the development of the comprehensive general plan.

Economics for Urban Planners: An introduction to microeconomic and macroeconomic theory in a context related to the needs of professional planners.

Interested students should consult the director of graduate studies for further details.

Courses for Graduate and Advanced Undergraduate Students

300. ISSUES IN URBAN EDUCATION POLICY AND PLANNING. 4 HOURS. Same as Education 300. Major areas of conflict—such as race and ethnic relations,

school governance, equality of opportunity, teacher bargaining, neighborhood control—that affect education in metropolitan areas. Emphasis on an understanding of the historical background and the current status of the selected issues and their implications for education policy and planning. Prerequisite: Consent of the instructor.

302. PHILOSOPHY OF EDUCATION AND URBAN SCHOOL POLICY. 4 HOURS. Same as Education 302. Systematic exploration of selected educational theories and philosophies; particular emphasis on their impact on the problems of formulating urban educational policy. Areas of special concern: serving pluralistic interests, curriculum design, school organization, and school control.

303. POLICY ISSUES IN THE HISTORY OF AMERICAN EDUCATION. 4 HOURS. Same as Education 303. Topical analysis of political, economic, and cultural influences shaping the development of American education policy; emphasis on issues of education theory and practice in their historical settings.

306. THE POLITICS OF URBAN EDUCATION. 4 HOURS. Same as Education 306 and Political Science 340. Relations between school governance and urban politics. Particular attention to the role of educational interest groups, the school board, professional educators, citizens, and civic leaders in the formulation and execution of education policy. Prerequisite: Consent of the instructor.

307. ALTERNATIVE EDUCATIONAL SYSTEMS. 4 HOURS. Same as Education 307. Selected systems within and outside the public school system. Emphasis on origins, nature, and potential eventualities, including impact on the public schools.

351. MEDICAL SOCIOLOGY. 4 HOURS. Same as Sociology 351. Sociological contributions to medicine and public health; social organization and the organization of health services; the sociology of illness. Prerequisite: 8 hours of upper-division sociology.

361. BIOMETRICS IN PUBLIC HEALTH. 3 HOURS. Same as Bi 300 (School of Public Health). Nature, scope, and terminology of biostatistics; appropriate uses and common misuses of health statistics; the application of selected statistical procedures. Theoretical aspects are held to a minimum; applicability of course content is relative to current health problems and programs. Prerequisite: Consent of the instructor.

362. PRINCIPLES OF EPIDEMIOLOGY. 3 HOURS. Same as Ep 300 (School of Public Health). Introduction to the analysis of the distribution of infectious and noninfectious diseases; the determinants of health and disease in populations; application of the epidemiologic method to disease prevention and control. Prerequisite: Credit or concurrent registration in UPP 361 or the equivalent.

363. PRINCIPLES OF ENVIRONMENTAL HEALTH. 3 HOURS. Same as EH 300 (School of Public Health). Environmental problems with emphasis on human health aspects; interactions among man, resources, and environment within the terrestrial system; trends and projections. Environmental insults within the air, water, and land environments. Legal and socioeconomic considerations. Case studies of current environmental controversies. Prerequisite: Consent of the instructor.

365. CONTEMPORARY HEALTH CARE SERVICES. 3 HOURS. Same as HC 300 (School of Public Health). Introduction to the medical care system: health

professions, hospitals, health insurance, government programs, professional organizations, cost and quality control, needs, demand, supply, availability, community health systems, political trends.

366.   EVALUATION OF HEALTH CARE SERVICES. 3 HOURS. Same as HC 313 (School of Public Health). Development of methodology, including policy analysis, systems approach, and decision models. The logical basis for health measurement and practical aspects of planning and executing evaluation studies.

368.   ECONOMICS OF HEALTH CARE. 3 HOURS. Same as HR 325 (School of Public Health). Elementary tools of microeconomics applied to current problems of resource allocation in the production of health services. Characteristics of United States health care sector; consumer demand for medical services; production and supply of health care facilities and personnel; productivity and cost measurement; restrictions on competition; health insurance proposals; cost-benefit analysis; environmental health.

380.   QUANTITATIVE SKILLS AND ANALYTICAL TOOLS I. 4 HOURS. Fundamental mathematical concepts, calculus, matrices, and probability. Research techniques, computer manipulation and storage of data. Estimation, regression, and correlations.

381.   QUANTITATIVE SKILLS AND ANALYTICAL TOOLS II. 4 HOURS. Survey of operations research techniques with urban applications. Introduction to a computer language. Urban information systems. Prerequisite: UPP 380.

382.   MANAGEMENT AND ADMINISTRATIVE SKILLS I. 4 HOURS. Provides the student with fundamental but sound knowledge and understanding of key administrative and managerial skills essential for urban policy makers and planners, organization behavior, and decision-making in the political environment. Prerequisite: Consent of the instructor.

383.   MANAGEMENT AND ADMINISTRATIVE SKILLS II. 4 HOURS. Continues Urban Planning and Policy 382. Relation and integration of operations, systems, and accounting methods to the decision-making process. Prerequisites: UPP 382 and consent of the instructor.

384.   HISTORY AND THEORY OF URBAN PLANNING AND POLICY. 4 HOURS. Study and analysis of those planning theories, policies, and methods that have evolved in response to the need for physical and human services planning in the urban community. Prerequisite: Consent of the instructor.

385.   HISTORY AND PROBLEMS OF URBAN SOCIETY I. 4 HOURS. The evolution of cities into urban complexes; emphasis on the various city-forming forces. Special attention to the benefits and problems stemming from the process of urbanization. Prerequisite: Consent of the instructor.

386.   HISTORY AND PROBLEMS OF URBAN SOCIETY II. 4 HOURS. Continues Urban Planning and Policy 385. Focus on specific as opposed to general topics. Prerequisites: UPP 385 and consent of the instructor.

387.   COMMUNITY STUDIES. 4 HOURS. Study and analysis of changing models of socialization, the community in the larger context, and principles of community organization. The sociology and anthropology of diverse populations in the city and in the suburbs are considered. Prerequisite: Consent of the instructor.

399. INDEPENDENT STUDY IN URBAN PLANNING. 2 TO 4 HOURS. Reading, study, research, and field work under the supervision of a faculty member. A written report with an annotated bibliography is required. Prerequisite: Approval of the Master of Urban Planning and Policy program director.

Courses for Graduate Students

401. REGIONAL PUBLIC POLICY PLANNING. 4 HOURS. The scope of regional planning. Regional economics as it affects planning; economic and population projections and techniques; issues in regional planning related to levels of control, regulation, and jurisdictions. Differences between comprehensive and categorical planning methods. Prerequisite: Concurrent registration in UPP 402.

402. STATE AND LOCAL PLANNING. 4 HOURS. Planning at the state, metropolitan, and local government levels. The scope of state, metropolitan, and local planning, the fragmentation of controls and jurisdictions, and the problems of comprehensive and categorical planning techniques. Relationships among state, local, and regional planning. Prerequisite: Concurrent registration in UPP 401.

405. URBAN MODELS AND PLANNING. 4 HOURS. Introduction to quantitative models used in urban planning. Case studies of selected models from the fields of demand models, deployment models, and regional planning models; input-output models and grand scale models. Prerequisites: UPP 380, 381.

406. URBAN MODELS LABORATORY. 4 HOURS. Laboratory experience with techniques in the construction and operation of models used in urban planning; introduction to major data sources. Prerequisite: UPP 405.

408. PLANNING ISSUES IN CLIENT-SERVICER RELATIONSHIPS. 4 HOURS. The theoretical and ethical issues of social intervention. The impact and effects of different definitions of intervention. Emphasis on the role of intervention, the relation of goals to programs, the role of the client in the program, and the impact of professionalization in service agencies. Prerequisites: UPP 401, 402.

411. RESOURCE AND EXPENDITURE PLANNING. 4 HOURS. Sources of funds planners may turn to for programs. Forms of taxation and appropriations commonly used to fund programs and planning agencies. Political and practical issues in planning income and expenditure policies. Prerequisite: UPP 381.

412. SOCIAL, ECONOMIC, AND POLITICAL RELATIONSHIPS BETWEEN PUBLIC AND PRIVATE SERVICES. 4 HOURS. The linkages between services defined as public and as private. Case studies are used to analyze forms of linkages where public and private services work in concert or at odds with each other. Processes that define certain services as public. Prerequisites: UPP 401, 402.

415. PRIVATE INVESTORS: PLANNING AND URBAN GROWTH. 4 HOURS. The major private sector actors of metropolitan development; their roles, incentives, and impact on new-growth areas, the inner city, older neighborhoods, and the inner-ring suburbs. Past and potential policies relating to the control of these actors.

431. COMMUNITY ORGANIZATION: METHODS AND APPLICATION. 4 HOURS. Political, social, and economic organization of American communities. Emphasis on neighborhood power structure and neighborhood interaction with broader communities. Prerequisite: Completion of the Master of Urban Planning and Policy core curriculum. Concurrent registration in UPP 432 is recommended.

432.   COMMUNITY PLANNING AND DEVELOPMENT. 4 HOURS. Theory and practice of local community development and planning. Analysis of factors that determine how communities develop and the role of planning in that development. Alternative development strategies and how planning can be used to implement them. Prerequisite: Completion of the Master of Urban Planning and Policy core curriculum. Concurrent registration in UPP 431 is recommended.

433.   PRINCIPLES OF PLANNING. 4 HOURS. Introduction to the techniques of physical planning. Basic principles, including concepts in spatial location and arrangement. Elementary visual presentation techniques; studio experience with planning problems. Prerequisite: Completion of the Master of Urban Planning and Policy core curriculum.

434.   COMMUNITY PLANNING. 2 TO 4 HOURS. Same as Social Work 453. A range of approaches to community planning; special emphasis on their application to the development and implementation of social welfare programs. Various levels of planning and their relationship to other planning professions. Professional skills included are technical data collection, political processes, grantsmanship, citizen involvement, advocacy roles, and models for evaluation. Prerequisite: UPP 439.

435.   DEVELOPMENT AND IMPLEMENTATION OF SOCIAL PLANNING POLICIES. 4 HOURS. The process of developing programs for social improvement. How social goals become policy and how that policy is implemented. Discussion of process participants and their interaction. Prerequisite: Consent of the instructor.

436.   ANALYSIS OF CONTEMPORARY SOCIAL POLICY AND PLANNING. 4 HOURS. Development of an analytical framework for the examination of social planning activities. Various approaches to social planning and evaluation of the relative utility of each. Prerequisite: Consent of the instructor.

437.   INNOVATION AND CHANGE IN SOCIAL PLANNING PROGRAMS AND ORGANIZATIONS. 4 HOURS. Seminar on the response of social welfare organizations and programs to changing or newly identified problems, crises, or altered priorities. Selected programs as they have evolved in response to changing attitudes or conditions. A major field work project is required. Prerequisite: Consent of the instructor.

438.   MAJORITY AND MINORITY CULTURAL INTERACTION. 2 TO 4 HOURS. Same as Social Work 449. Critical examination of the nature and development of status and economic factors likely to be important in accounting for majority and minority cultural interaction. Analysis of various conditions under which competition with minorities may or may not result in discrimination. Implications of this analysis for social work practice and the role of the professional social worker.

439.   COMMUNITY PROBLEM-SOLVING. 2 TO 4 HOURS. Same as Social Work 451. Introduction to the nature and scope of social work intervention at the community level. Analysis of distinctive characteristics of the community as the locus for various social systems; emphasis on their implications for practice. Appropriate methods of problem-solving. Prerequisite: SocW 425.

440.   COMMUNITY DEVELOPMENT. 2 TO 4 HOURS. Same as Social Work 452. Community development theory and practice are analyzed and evaluated with given practitioner roles, community resources, client systems, and other means of change and development as affected by a variety of social, cultural, political,

economic, geographic, and historical considerations, both foreign and domestic. Emphasis on the conditions students are likely to encounter in actual practice. Prerequisite: UPP 439.

450.   URBAN LAND USE POLICY AND PRACTICE I. 4 HOURS. Historical view of urban land use planning with special emphasis on public land ownership in city development; various techniques of land use control and regulation at the local, state, and federal levels; social implications of land use policy and practice. Prerequisite: Consent of the instructor.

451.   URBAN LAND USE POLICY AND PRACTICE II. 4 HOURS. Emphasis on public and private interests in land use decision-making; economic and political implications; influence of federal policy and programs on land development; ecological and environmental considerations; innovations in land use control and future policy alternatives. Prerequisites: UPP 450 and consent of the instructor.

452.   TOPICS IN URBAN GROWTH AND DEVELOPMENT. 4 HOURS. Factors influencing, negatively or positively, urban growth and development. Smaller urban complexes and vast urban conurbations. Areas for analysis are selected jointly by instructors and students. Examples: economic considerations, government programs and policies, planning concepts, national housing goals. Prerequisite: Consent of the instructor.

453.   GRADUATE PROFESSIONAL FIELD EXPERIENCE IN URBAN POLICY AND PLANNING. 0 TO 16 HOURS. Based on negotiations among the program's faculty, the student, and a receiving agency in either the public or the private sector, the student undertakes a full-time professional field assignment for one quarter. The nature and intent of the assignment is determined in advance. An appropriate paper based on the experience is required. Prerequisites: At least 24 hours of 400-level work in the Urban Planning and Policy program and consent of the instructor.

463.   THE POLITICS OF HEALTH CARE. 3 HOURS. Four aspects of the political process as they relate to health care services: expression of public interest, electorate demand for government intervention, negotiation of conflict of interests, and passage of bills through congressional committees and Congress. Prerequisite: Consent of the instructor.

464.   THE GEOGRAPHY OF HEALTH CARE. 3 HOURS. Application of spatial and locational concepts and models to existing health facilities and personnel and to planning their future supply. Prerequisite: Consent of the instructor.

467.   THE HEALTH CARE SYSTEM. 3 HOURS. Same as HC 410 (School of Public Health). A systems analysis approach to the interrelationships of the six components of health: illness, epidemiology, facilities and manpower, financing utilization, and organization of services.

468.   THEORIES AND CONCEPTS OF HEALTH PLANNING. 3 HOURS. Conceptual, analytical, and systems framework to evaluate and plan the organization, distribution, financing, and delivery of health care services in the United States. Prerequisite: UPP 365.

469.   HEALTH PLANNING IN THE UNITED STATES. 3 HOURS. Descriptive and analytical review of major health planning efforts, including the legislation and experimentation of the last decade; emphasis on elements evolving in current national health insurance proposals. Prerequisite: UPP 365.

491.   PROBLEMS IN URBAN EDUCATION. 4 HOURS. May be repeated up to a total of 8 hours. Same as Education 491. Intensive field-oriented study of selected urban educational problems, such as bureaucracy and education, ethnic concern and schools, and educational finance. Emphasis on the collection and analysis of appropriate data.

492.   SCHOOL FINANCE AND POLICY ANALYSIS. 4 HOURS. Same as Education 401. Concepts of school finance, taxation, and resource allocation. Role of state, local, and federal governments in the support of education. Fundamentals of program budgeting and systems analysis techniques in educational planning. Prerequisite: Consent of the instructor.

493.   IMPROVING EDUCATIONAL ORGANIZATIONS: PLANNING AND DECISION-MAKING. 4 HOURS. Same as Education 402. The decision-making process within educational organizations. Different theories of decision-making are analyzed and applied to the formulation of school policy. Prerequisite: Consent of the instructor.

498.   INDEPENDENT STUDY IN URBAN POLICY AND PLANNING. 4 TO 16 HOURS. Advanced independent study and analysis of approved topics selected and agreed upon by the student and his adviser. A written report prepared under the guidance of the faculty adviser is required. Prerequisite: Consent of the instructor.

Additional Courses for Graduate Credit

ACCOUNTING

Courses for Graduate and Advanced Undergraduate Students

311. ACCOUNTING THEORY I. 4 HOURS. Development and applications as related to financial statements, valuation of assets, and measurements of income. Prerequisites: Actg 111 and declaration of a major.

312. ACCOUNTING THEORY II. 4 HOURS. Development and applications as related to financial statements, liabilities, owner's equity, and measurement of income. Special topics include price level changes and accounting changes. Prerequisites: Actg 311 and declaration of a major.

313. ACCOUNTING THEORY III. 4 HOURS. Development and applications as related to investments, business combinations, foreign exchange, and fund accounting. Special topics include earnings per share and the statement of changes in financial position. Prerequisites: Actg 312 and declaration of a major.

320. MANAGERIAL COST ANALYSIS. 4 HOURS. Analysis of costs for decision-making, planning, and control; standards and budgets as a guide to measuring and controlling performance; costing systems for various purposes. Prerequisites: Actg 312 and declaration of a major.

325. COMPUTER ACCOUNTING SYSTEMS. 4 HOURS. Aspects of computer systems designed to perform accounting functions. Topics include programming, file construction, data retrieval, and controls. Prerequisites: Math 194, Actg 320, and declaration of a major.

330. AUDITING. 4 HOURS. History, function, and theory; nature of necessary evidence for the accountant's professional opinion concerning a financial position and the results of enterprise operations; applications of statistical sampling; auditing computerized systems. Prerequisites: Actg 313, 320, and declaration of a major.

340. FEDERAL INCOME TAX. 4 HOURS. Concepts of federal income tax; its effects on decisions of corporations, partnerships, individuals, and trusts. Prerequisites: Actg 313 and declaration of a major.

341. ADVANCED FEDERAL INCOME TAX. 4 HOURS. Tax factors affecting business decisions of corporations and partnerships; special problems in reorganizations, liquidations, and personal holding companies. Advanced development of basic concepts discussed in Accounting 340. Prerequisites: Actg 340 and declaration of a major.

342. ESTATE, GIFT, AND TRUST TAXATION. 4 HOURS. Internal Revenue Code treatment of estate, gift, and trust entities; some legal principles necessary to comprehend tax planning. Prerequisites: Actg 341 and declaration of a major.

350. BUSINESS LAW I. 4 HOURS. Fundamental rules of law applicable to business activity. Contract and agency; the nature and formation of contractual obligations; sales of personal property; commercial paper under the Uniform Commercial Code. Prerequisites: Junior standing and declaration of a major.

351. BUSINESS LAW II. 4 HOURS. Business units through which business is conducted and the legal rules governing formation, operation, and dissolution of partnerships and corporations. Basic rules of real property law, insurance and bankruptcy, bailments, and carriers. Accountants' legal liability. Restraint of trade. Prerequisites: Actg 350 and declaration of a major.

360. ACCOUNTING FOR NONPROFIT ORGANIZATIONS. 4 HOURS. Special accounting problems and techniques associated with private and public nonprofit organizations. Prerequisites: Actg 313, 320, and declaration of a major.

380. INTERNATIONAL ACCOUNTING. 4 HOURS. An advanced course. Pertinent areas of accounting from a multinational viewpoint. Four specific areas covered are financial accounting for international operations, multinational managerial accounting and control, comparative international accounting principles, and international financial reporting. Prerequisites: Actg 313, 320, and declaration of a major.

390. SPECIAL TOPICS IN ACCOUNTING. 4 HOURS. Selected topics in various fields, including public accounting, managerial accounting, and tax accounting. Selected readings from professional and academic journals and cases for analysis. Prerequisites: Actg 313, 320, and declaration of a major.

399. INDEPENDENT STUDY IN ACCOUNTING. 4 HOURS. Advanced independent study in approved topics. A written report prepared under the guidance of a faculty member is required. Prerequisites: Actg 313, 320, declaration of a major, and approval of the department.

Courses for Graduate Students

400. MANAGERIAL ACCOUNTING I. 4 HOURS. Basic concepts and tools of analysis necessary for the quantification, recording, and communication of financial events.

401. MANAGERIAL ACCOUNTING II. 4 HOURS. Accounting methods applicable to the determination and analysis of financial data relevant to managerial decision problems. Topics include cost behavior, budgeting for planning and control, cost allocation, cost accounting systems, and capital budgeting. Prerequisite: Actg 400.

402. FINANCIAL ACCOUNTING I. 4 HOURS. Formulation of a conceptual model of accounting valuation and its implications for accounting practice; accounting valuation methods applied to assets and equities and their relationship to the conceptual model; concepts and criteria underlying income determination. Prerequisite: Actg 401.

403. FINANCIAL ACCOUNTING II. 4 HOURS. Accounting procedures applicable to the formation, expansion, and dissolution of different business entities, such as partnerships, corporations, trusts, and estates; emphasis on accounting for the corporate entity. Prerequisite: Actg 402.

406. FINANCIAL PLANNING AND CONTROL. 4 HOURS. The uses of financial information for decision-making control; the role of the accounting system and corporate controller in developing and refining the data necessary for cost control and managerial planning. Prerequisite: Actg 401.

ARCHITECTURE

Courses for Graduate and Advanced Undergraduate Students

301. ARCHITECTURAL DESIGN VII. 6 HOURS. Comprehensive architectural problems. Prerequisites: Arch 104 and completion of the fourth-year program in architecture.

302. ARCHITECTURAL DESIGN VIII. 6 HOURS. Comprehensive architectural design problems. Prerequisite: Arch 301.

309. ARCHITECTURAL DESIGN THESIS. 6, 9, OR 12 HOURS. May be repeated for a total of 18 hours. Individual problems. Prerequisite: Arch 301.

311. FORENSIC ARCHITECTURE. 3 HOURS. Legal problems in architecture. Prerequisite: Fifth-year standing.

312. COMPUTER APPLICATIONS IN ARCHITECTURE. 3 HOURS. Computer methods and techniques in architectural design, construction, engineering, and urban planning. Prerequisite: Math 194 or 195.

313. BUILDING CONSTRUCTION SYSTEMS I. 6 HOURS. Static and dynamic environmental control systems. Prerequisites: Arch 204, 215, and completion of the fourth-year program in architecture.

314. INDUSTRIALIZED BUILDING. 3 HOURS. Industrialized and prefabricated building systems: materials, production techniques, transportation and assembly methods. Prerequisite: Fifth-year standing.

315. LOGISTICS OF BUILDING CONSTRUCTION AND PROJECT MANAGEMENT. 3 HOURS. Job scheduling and project control. Construction process simulation, actual site logistics, and productivity. Prerequisite: Fifth-year standing.

316. BUILDING CONSTRUCTION SYSTEMS II. 6 HOURS. Illumination, heating and air conditioning systems, acoustics; problems of interrelationships with other disciplines and the building industry. Prerequisite: Arch 313.

319. BUILDING TECHNOLOGY THESIS. 6, 9, OR 12 HOURS. May be repeated for a total of 18 hours. Individual problems. Prerequisite: Arch 313.

322. STRUCTURAL SEMINAR I. 3 HOURS. May be repeated for credit. Selected topics in structural analysis and design. Prerequisites: Completion of 200-level structural engineering courses, Math 220, and the fourth-year program in architecture.

323. INTERMEDIATE STRUCTURAL ANALYSIS. 6 HOURS. Analysis of statically intermediate coplanar and space structures. Prerequisites: Completion of 200-level structural engineering courses, Math 220, and fourth-year program in architecture.

325. STRUCTURAL SEMINAR II. 3 HOURS. May be repeated for a total of 9 hours of credit. Selected topics in structural analysis and design. Prerequisites: Arch 225, Math 220.

331. ARCHITECTURE SEMINAR. 1 TO 5 HOURS. May be repeated for a total of 15 hours. Current problems. Prerequisite: Fourth-year standing.

332.   ARCHITECTURE READING COURSE. 1 TO 5 HOURS. May be repeated for a total of 15 hours. Individually planned readings on selected topics under the supervision of a faculty member. Prior to registration the student should be advised by the instructor. Prerequisite: Fourth-year standing.

339.   ARCHITECTURAL HUMANITIES THESIS. 12 HOURS. Individual problems. Prerequisite: 12 hours in the history of architecture.

343.   PROFESSIONAL PRACTICE. 3 HOURS. Problems related to the practice of architecture. Prerequisite: Fifth-year standing.

399.   INDIVIDUAL STUDY: SPECIAL TOPICS III. 1 TO 6 HOURS. May be repeated for credit for a maximum of 18 hours. Selected topics for individual investigation. Prerequisite: Consent of the instructor.

ART-DESIGN

Courses for Graduate and Advanced Undergraduate Students

300.   ART AND DESIGN SYNTHESIS. 4 HOURS. May be repeated for credit. Individual-project course. Students develop projects that synthesize the experience of 200-level courses in the Department of Art. Emphasis is on interdisciplinary activities. Prerequisites: 40 hours of 200-level courses in the Department of Art and approval of the department.

301.   INDEPENDENT STUDY. 4 TO 12 HOURS. Students may enroll in more than one 4-hour section per quarter or may repeat the course in 4-hour sections in subsequent quarters. Independent study under supervision of a staff member in an area of design or plastic and graphic arts not covered in the regular curriculum. The course is offered at the request of the student and only at the discretion of the staff members concerned. Prerequisites: 30 hours of 200-level courses and approval of the department.

303.   PHOTOGRAPHY-FILM TUTORIAL. 4 TO 16 HOURS. Students may enroll in more than one 4-hour section per quarter or may repeat the course in 4-hour sections in subsequent quarters. Independent study course. Sustained projects in any area of film activity or still photography. Prerequisites: AD 265 or 275 or graduate standing and approval of the department.

304.   PROFESSIONAL PRACTICE. 2 HOURS. Professional practice and management, proposals, contracts, and legal issues for designers. Prerequisite: AD 212 or 222 or consent of the instructor.

305.   PLASTIC AND GRAPHIC ARTS. 4 TO 16 HOURS. Students may enroll in more than one 4-hour section per quarter or may repeat the course in 4-hour sections in subsequent quarters. Individual projects are developed by each student through tutorial consultation with an assigned instructor; may involve supportive consultation in all areas of the department to permit breadth and invention in media and processes. Prerequisites: 25 hours of appropriate 200-level courses and approval of the department.

307.   COLLOQUIUM ON DESIGN THEORY. 2 TO 4 HOURS. May be repeated with the approval of the department. Design theories in relation to new technologies and systems of communications and to local and regional problems. Prerequisite: Completion of the foundation program.

308.   COMPUTER ART-DESIGN. 4 HOURS. May be repeated twice for credit. A practical exploration into the computer as a tool for the artist-designer. Prerequisites: Senior or graduate standing and Math 194 or the equivalent.

309.   TEKART. 4 HOURS. May be repeated twice for credit. Technological art; emphasis on group projects leading to exhibition or event. Prerequisites: Senior or graduate standing and AD 308 or 208.

310.   COMMUNICATIONS DESIGN. 4 TO 16 HOURS. Students may enroll in more than one 4-hour section per quarter or may repeat the course in 4-hour sections in subsequent quarters. A comprehensive project in the area of social communications. A total program or a series of related units for use in one or more communications media is developed by each student through tutorial consultation with an assigned instructor. Prerequisites: AD 215 or graduate standing and approval of the department.

312.   MASS PRINTING TECHNOLOGY. 4 HOURS. Lectures, field trips, and laboratory experience. Prerequisite: AD 212.

313.   TELEVISION MEDIA. 4 HOURS. Television methods and techniques as related to the needs of the graphic communicator. Prerequisite: AD 212.

320.   INDUSTRIAL DESIGN. 4 TO 16 HOURS. Students may enroll in more than one 4-hour section per quarter or may repeat the course in 4-hour sections in subsequent quarters. Design of physical systems based upon user behavior, technical resources, and environmental factors. Investigation of system failures and product dysfunctions at the man/machine, work space, and environmental levels. Projects are developed by the student through tutorial consultation with an assigned instructor. Prerequisites: AD 225 or graduate standing and approval of the department.

342.   SCULPTURE III: ADVANCED STUDIO. 8 HOURS. Must be repeated twice. Experiment and study in depth of contemporary concepts, processes, and techniques to develop a personal, creative visual language. Primarily self-directed under the supervision of the entire sculpture faculty. Prerequisite: Credit or concurrent registration in AD 241.

350.   INDEPENDENT STUDY IN PRINTMAKING. 2 TO 6 HOURS. May be repeated for a maximum of 12 hours of credit. Independent study in an area not covered by existing course offerings or exploration in greater depth of a problem or area covered in a previously taken course. Prerequisite: 20 hours of printmaking, including AD 250 and any four of AD 251, 252, 253, 254, 351.

351.   ADVANCED PRINTMAKING STUDIO. 4 HOURS. May be repeated once. Expansion of basic techniques and introduction to new media; emphasis on experimentation and innovation. Prerequisite: 12 hours of printmaking, including AD 250 and any two of AD 251, 252, 253, 254.

360.   PHOTOGRAPHY COLLOQUIUM. 1 HOUR. May be repeated twice. Films, lectures, and discussion on the application and appreciation of photography. Special lectures on related subjects. Prerequisite: Completion of the foundation program in art.

BLACK STUDIES

Courses for Graduate and Advanced Undergraduate Students

370.   TOPICS IN BLACK CULTURE. 4 HOURS. Seminar. Prerequisite: BlSt 171.

379.   INTRODUCTION TO AFRO-FRENCH LITERATURE. 4 HOURS. Same as French 379. Selected prose and poetry of sub-Sahara African Francophone literature. Prerequisites: Fr 201 and any two of Fr 202, 203, 204, 205 or the equivalents.

386.   TOPICS IN RACE, ETHNIC, AND MINORITY HISTORY. 4 HOURS. May be repeated for credit. Same as History 386. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

CLASSICS

Courses for Graduate and Advanced Undergraduate Students

348.   MYTHOLOGY IN ROME. 4 HOURS. Same as Religious Studies 300. The conscious assimilation and adaptation of Greek mythology in Rome; investigation of the concept of mythology. Prerequisite: Cl 248.

349.   CLASSICAL RHETORICAL TRADITION. 4 HOURS. Development from the beginnings in ancient Greece to the Renaissance. Chief emphasis on the rhetorical works of Plato, Aristotle, Cicero, and Quintilian. Prerequisites: Junior standing and consent of the instructor.

350.   AESCHYLUS AND SOPHOCLES. 4 HOURS. Knowledge of Greek is not required. Close reading of all of the plays of Aeschylus and Sophocles in translation; discussion of literary, moral, religious, political, and mythical issues and ideas. Prerequisite: Cl 249.

351.   EURIPIDES. 4 HOURS. Knowledge of Greek is not required. Close study of the works of Euripides, the environment in which they were created, and their influence on later European drama. Prerequisite: Cl 249.

370.   PLATO: *DIALOGUES*. 4 HOURS. The middle and late *Dialogues* and their fourth-century context.

393.   TRANSLATION: THEORY AND PRACTICE. 4 HOURS. A reading knowledge of Greek or Latin is expected. Introduction to classical and post-Renaissance concepts of fidelity and creativity; a practicum devoted to authors previously emphasized in the student's curriculum. Prerequisite: Consent of the instructor.

398.   TOPICS IN CLASSICAL CIVILIZATION. 4 HOURS. Knowledge of Greek or Latin is not required. Significant themes and topics in classical literature and society. Topics vary. Prerequisite: Two courses in classics at the 200 level, excluding Cl 201.

EDUCATION

Courses for Graduate and Advanced Undergraduate Students

300.   ISSUES IN URBAN EDUCATION POLICY AND PLANNING. 4 HOURS. Same as Urban Planning and Policy 300. Major areas of conflict, such as race and ethnic relations, school governance, equality of opportunity, teacher bargaining, neighborhood control, that affect education in metropolitan areas. Emphasis on an understanding of the historical background and the current status of the selected issues and their implications for education policy and planning. Prerequisite: Consent of the instructor.

301.   EDUCATIONAL POLICY IN URBAN AMERICA. 4 HOURS. Examination of selected urban phenomena in relation to educational bureaucracies and school socialization processes. Emphasis on historical investigation of strategies for protest and change employed by ghetto populations; conditions that fostered these strategies; responses of schools and other target institutions; social-philosophical analysis of ideologies supporting both protest and response.

302.   PHILOSOPHY OF EDUCATION AND URBAN SCHOOL POLICY. 4 HOURS. Same as Urban Planning and Policy 302. Systematic exploration of selected educational theories and philosophies; particular emphasis on their impact on the problems of formulating urban educational policy. Areas of special concern: serving pluralistic interests, curriculum design, school organization, and school control.

303.   POLICY ISSUES IN THE HISTORY OF AMERICAN EDUCATION. 4 HOURS. Same as Urban Planning and Policy 303. Topical analysis of political, economic, and cultural influences shaping the development of American education policy; emphasis on issues of education theory and practice in their historical settings.

304.   PRACTICUM IN EARLY CHILDHOOD EDUCATION. 4 HOURS. Field placement in a child development center under the supervision of an approved qualified teacher. Experience in planning activities, evaluating the developmental progress of the children, and methods of child management. Weekly seminars to discuss the work. Prerequisite: Ed 210 or 250 or Psch 220.

305.   EDUCATIONAL POLICY FOR CITIZENS. 4 HOURS. Same as Social Work 305. The concepts and information that all citizens need to participate effectively as education consumers and policy affectors. History, economics, basic statistics, sociology, research, and current and future trends affecting American education at all levels. Prerequisite: Consent of the instructor.

306.   THE POLITICS OF URBAN EDUCATION. 4 HOURS. Same as Political Science 340 and Urban Planning and Policy 306. Relations between school governance and urban politics. Particular attention to the role of educational interest groups, the school board, professional educators, citizens, and civic leaders in the formulation of educational policy. Prerequisite: Consent of the instructor.

307.   ALTERNATIVE EDUCATIONAL SYSTEMS. 4 HOURS. Same as Urban Planning and Policy 307. Selected systems within and outside the public school system. Emphasis on origins, nature, and potential eventualities, including impact on the public schools.

310. SURVEY OF CHARACTERISTICS AND EDUCATION OF EXCEPTIONAL CHILDREN. 4 HOURS. Development and organization of special education programs for children who have learning disabilities, emotional and behavior disorders, or impaired hearing or who are educationally mentally retarded. Screening techniques, referral processes, educational objectives, and program structure. Prerequisite: Ed 321.

311. INTRODUCTION TO CHILDREN WITH LEARNING DISABILITIES. 4 HOURS. Principal theories of learning and language disorders, language development, remediation of learning and language deficiencies, and the utilization of various communication techniques in the remedial education process. Prerequisites: Acceptance in advanced-level special education courses and consent of the instructor.

312. EDUCATIONAL METHODS FOR CHILDREN WITH LEARNING DISABILITIES. 4 HOURS. Development of educational programs related to specific learning disabilities, including instructional methods and materials. Prerequisite: Ed 311.

313. EDUCATIONAL DEVELOPMENT AND PROGRAM PLANNING FOR THE MENTALLY RETARDED CHILD. 4 HOURS. The nature, characteristics, and educational implications for the cognitive, social, and physical development of the retarded child in the educational setting. Prerequisites: Ed 310 and consent of the instructor.

314. METHODS OF INSTRUCTION FOR THE EDUCABLE MENTALLY RETARDED. 4 HOURS. The organization and content of public school programs; emphasis on selecting, developing, and adapting teaching materials and techniques. Principles of parent counseling; survey of community services. Prerequisite: Ed 313.

315. EDUCATIONAL DEVELOPMENT AND PROGRAM PLANNING FOR THE EMOTIONALLY DISTURBED AND SOCIALLY MALADJUSTED CHILD. 4 HOURS. The nature, characteristics, and educational implications for cognitive, social, and physical development within the school setting. Prerequisites: Ed 310 and consent of the instructor.

316. METHODS OF TEACHING THE DISTURBED AND MALADJUSTED CHILD. 4 HOURS. Specific behavioral management techniques for classroom use. Development of curriculum, methods, and materials appropriate for disturbed children in an educational setting. Prerequisite: Ed 315.

317. LANGUAGE CONCEPTS FOR THE HEARING IMPAIRED INTERMEDIATE AND SECONDARY STUDENT. 5 HOURS. Theoretical and educational aspects of language concepts utilized at the intermediate and high school levels. Prerequisite: Consent of the instructor.

318. RESEARCH AND EVALUATION IN SPECIAL EDUCATION. 4 HOURS. Analysis of basic research issues; the theoretical models for evaluating a noncategorical, competency-based approach to the education of the exceptional child. Prerequisites: Acceptance in advanced-level special education courses and consent of the instructor.

319. CLINICAL EXPERIENCE IN REMEDIAL TEACHING. 4 HOURS. Demonstrations by students of the ability to diagnose, prescribe, and develop a remedial program. Utilization of educational clinic and field internship experience with

handicapped children in an educational setting. Prerequisites: Acceptance in advanced-level special education courses and consent of the instructor.

320.   SOCIAL DEVELOPMENT OF URBAN CHILDREN. 4 HOURS. The general principles of social learning and socialization during childhood and the factors common to urban children that illustrate and modify these principles. Classroom observation of children and interviewing are required. Prerequisite: Psch 220 or the equivalent by consent of the instructor.

321.   ADVANCED EDUCATIONAL PSYCHOLOGY. 4 HOURS. Psychological theories and principles of learning as they apply to the teaching-learning process; particular attention to the investigation of central concepts of the psychology of learning in the urban classroom. Prerequisites: Ed 210, 250 or the equivalents and consent of the instructor.

322.   ADVANCED DEVELOPMENTAL PSYCHOLOGY AND EDUCATIONAL PROCESSES. 4 HOURS. Normal growth stages in language, physical growth, cognitive development, and social behavior from birth through adolescence; their relationship to major theories and to educational planning and practice. Prerequisite: Ed 321.

323.   CURRICULUM IN EARLY CHILDHOOD EDUCATION. 4 HOURS. Educational implications of major schools of thought concerning the nature and course of child development and learning; differential effectiveness of programs oriented to various theories; special emphasis on intervention programs designed for impoverished populations, including Head Start. Prerequisites: Psch 101, 220 or the equivalents and consent of the instructor.

324.   DIFFERENTIAL DIAGNOSIS OF LEARNING AND BEHAVIOR PROBLEMS. 4 HOURS. Characteristics of children with learning and behavioral problems. Theoretical basis for diagnosis and remediation of learning and behavior disorders. Prerequisite: Ed 325.

325.   BEHAVIORAL MANAGEMENT THEORY AND TECHNIQUE. 4 HOURS. Utilization of behavior modification training and applied techniques in classroom management in the education of children with learning and behavior difficulties.

326.   PRESCRIPTIVE AND REMEDIAL TEACHING IN SPECIAL EDUCATION. 4 HOURS. Various techniques for the remediation of learning and behavioral problems; application of these methods to a wide variety of school learning and behavior problems. Demonstrations by students of their ability to assess and plan successful remedial programs for individual children. Prerequisite: Permission to take graduate-level courses in special education.

327.   ART MEDIA AND THEIR UTILIZATION WITH THE HANDICAPPED CHILD. 4 HOURS. Theoretical basis for utilization of art media with the handicapped. Student demonstrations of specific art media competencies in an applied setting with handicapped children. Prerequisites: Ed 324, 326.

328.   PERCEPTUAL MOTOR EDUCATION AND THE HANDICAPPED CHILD. 4 HOURS. The interaction between the exceptional child's learning abilities and his perceptual motor development and skills. Seminar; student demonstrations of specific physical education and recreation competencies. Prerequisites: Ed 324, 326.

329.   INTRODUCTION TO THE THEORY OF JEAN PIAGET. 4 HOURS. Jean Piaget's genetic theory of the development of knowledge. His studies of cognitive development in children, especially his views on memory, learning, and intelligence. Educational implications. Prerequisites: Psch 101, 220.

330.   CURRICULUM, INSTRUCTION, AND EVALUATION IN URBAN EDUCATION I. 4 HOURS. A laboratory-discussion course; emphasizes the changing role of education in urban society and the implications of changes on curriculum decision-making, design, instruction, and evaluation. Prerequisites: Ed 250 or graduate standing and consent of the instructor.

331.   IMPROVING LEARNING ENVIRONMENTS. 4 HOURS. Development of the basic skills and the understanding necessary to bring about productive changes in a school system; the skills are developed in conjunction with a plan for improving a specific learning environment. The consequences of change in the school as a social system. Prerequisites: One methods course or graduate standing and consent of the instructor.

332.   ISSUES IN SECONDARY CURRICULUM. 4 HOURS. Analysis of selected issues; investigation of viewpoints in related literature; field investigations when pertinent. Specialists are invited. Prerequisite: Ed 230 or a methods course offered in the student's major department or graduate standing.

333.   TOPICS IN CURRICULUM, INSTRUCTION, AND EVALUATION. 1 TO 12 HOURS. May be repeated for up to 12 hours of credit. Workshop in selected topics; special application to classroom organization and instruction. Each topic is announced at the time the class is scheduled. Prerequisite: Classroom teaching experience.

340.   INTERNSHIP IN SPECIAL EDUCATION. 4 HOURS. Utilization of an educational clinic to develop specific diagnostic, prescriptive, and remedial educational skills in depth. An urban school setting is utilized for the second phase of internship; students work under the direction of a master teacher, applying the theory and skills developed in the educational clinic. Prerequisites: Acceptance in advanced-level special education courses and consent of the instructor.

341.   CURRICULUM METHODS AND MATERIALS FOR THE TRAINABLE MENTALLY HANDICAPPED. 4 HOURS. Appropriate curriculum, instructional methods, and materials; behavioral and academic objectives; instructional theory and techniques. Prerequisites: Ed 310 and consent of the instructor.

360.   DIFFERENTIATED READING INSTRUCTION. 4 HOURS. Students acquire competency in the teaching of individualized reading, remedial reading, and reading advancement programs through supervised field experience and seminar discussions. Prerequisites: Ed 262 or 265 and consent of the instructor.

361.   CORRECTIVE READING INSTRUCTION. 4 HOURS. Informal instruments for assessing pupil needs in reading diagnosis of test results for instructional direction; planning and teaching on a one-to-one basis; evaluation of pupil growth through post-tests. Prerequisites: Ed 261, 262 or 261, 265.

370.   FIELD WORK FOR URBAN EDUCATION. 8 HOURS. Time is shared between field work and classroom to enable students to become intimately aware of city life as it affects children and education. The different work sections are: (1) workers in a black community; (2) workers in a Latin or Indian community; (3) workers in a selected white ethnic community; (4) school administrators and

counselors; (5) workers in human relations areas. Prerequisites: Ed 250 or graduate standing and consent of the instructor.

371.   COMMUNITY EDUCATION LABORATORIES. 5 HOURS. Three hours class time; ten to fourteen hours per week in directed field work. Analysis of the nature of the educational enterprise and of the relationships among the educational controllers, the teacher, and the community, through reading, lecture, discussion, and field work. Techniques for altering professional accountability of teachers from the employing community to the students and community they purport to help. Prerequisite: Consent of the instructor.

383.   TEACHING ENGLISH AS A SECOND LANGUAGE. 4 HOURS. Same as English 383. The methodology of teaching English to residents of the United States who do not speak the language, especially Spanish-Americans. Prerequisite: Engl 300 or 205 or Ling 305.

390.   CRITIQUE OF EDUCATIONAL LITERATURE, RESEARCH DESIGN, AND METHODOLOGY. 4 HOURS. Introduction to educational research literature; analysis of research findings in urban education; research methods and design in education; current issues in research methodology. Each student formulates a researchable problem and designs a systematic study in his area of concentration. Prerequisites: Ed 250 or graduate standing and consent of the instructor.

Courses for Graduate Students

400.   SEMINAR ON EDUCATIONAL SOCIOLOGY. 4 HOURS. Sociological survey of the urban educational institution in the contexts of its neighborhood and of the larger social order. The school is considered a community with its own social structure and culture interacting with a neighborhood with a differing social structure and culture. The interface between school and neighborhood is studied in detail. Prerequisites: Ed 370 or the equivalent and consent of the instructor.

401.   SCHOOL FINANCE AND POLICY ANALYSIS. 4 HOURS. Same as Urban Planning and Policy 492. Concepts of school finance, taxation, and resource allocation. Role of state, local, and federal governments in the support of education. Fundamentals of program budgeting and systems analysis techniques in educational planning. Prerequisite: Consent of the instructor.

402.   IMPROVING EDUCATIONAL ORGANIZATIONS: PLANNING AND DECISION-MAKING. 4 HOURS. Same as Urban Planning and Policy 493. The decision-making process within educational organizations. Different theories of decision-making are analyzed and applied to the formulation of school policy. Prerequisite: Consent of the instructor.

420.   EARLY CHILDHOOD PROGRAM DEVELOPMENT I. 4 HOURS. Laboratory-discussion course; utilizes the student's teaching situation as the practicum site for practice in program development. Discussion topics include goals and objectives, materials and equipment, and establishing and maintaining a learning environment. Prerequisite: Ed 323.

421.   EARLY CHILDHOOD PROGRAM DEVELOPMENT II. 4 HOURS. Laboratory-discussion course; utilizes the student's teaching situation as the practicum site for practice in program development. Discussion topics include implementation of curriculum objectives and evaluation of the individual child. Prerequisite: Ed 420.

422.   EARLY CHILDHOOD PROGRAM DEVELOPMENT III. 4 HOURS. Laboratory-discussion course; utilizes the student's teaching situation as the practicum site for practice in program development. Discussion topics include implementation of curriculum objectives, evaluation of the individual child, the family, and the community, working with classroom assistants and volunteers, and articulation with public school programs. Prerequisite: Ed 421.

426.   BIOLOGICAL, COGNITIVE, AND SOCIAL DEVELOPMENT IN INFANCY AND EARLY CHILDHOOD. 4 HOURS. Intensive consideration of developmental processes, capacities, and readiness from birth to the age of 6 years. Stress is on theories, research, individual child study, and educational implications. Prerequisite: Ed 322.

430.   CURRICULUM,   INSTRUCTION,   AND   EVALUATION   IN   URBAN EDUCATION II. 4 HOURS. Emphasizes dynamics of group decision-making in developing curricula for community schools, producing instructional materials for a selected community, and evaluating effectiveness of the instructional materials. The different work sections are: (1) black ghetto community; (2) Spanish-speaking community; (3) other selected communities. Prerequisites: Ed 330, 370, 490 or the equivalent and consent of the instructor.

431.   CURRICULUM THEORY AND TECHNOLOGY. 4 HOURS. Components of the curriculum system are analyzed through the study of curriculum theory. The technology of curriculum planning, and of implementing and evaluating local, state, and national curricula. Prerequisites: Ed 430 or the equivalent and consent of the instructor.

432.   RESOURCES AND METHODS FOR INSTRUCTIONAL IMPROVEMENT. 4 HOURS. Offered in collaboration with the Chicago Board of Education staff to develop an understanding of available resources and methods for initiating innovation plans for in-service instruction and program development. Emphasis on understanding the public school system and the ways in which its various components interact. Prerequisite: Ed 331.

439.   INTERNSHIP IN IN-SERVICE AND PRESERVICE LEADERSHIP. 8 HOURS. The internship is conducted in the school in which the candidate is employed. Working under the supervision of the school principal and a member of the University faculty, the intern supervises a group of student teachers and develops a plan for instructional improvement on a systematic basis. Prerequisite: Ed 432.

440.   GUIDANCE IN THE URBAN SCHOOL: PRINCIPLES AND FUNCTIONS. 4 HOURS. The guidance process concerned with providing for the developmental needs of all pupils. The interrelated roles of teacher, counselor, and other staff members in fostering a climate in which healthy personalities can develop; emphasis on the full use of school and community resources. Prerequisites: Ed 370 and consent of the instructor.

441.   STUDENT APPRAISAL PROCEDURES IN THE URBAN SCHOOL. 4 HOURS. Examination of some of the ways in which the teacher and counselor can assess child behavior and development. Nontesting methods and interpretation of selected achievement, aptitude, and interest tests at different educational levels. Emphasis on the understanding of cultural factors that may limit effective appraisal. Prerequisite: Ed 440.

442.   THE COUNSELING PROCESS. 4 HOURS. The nature, functions, and goals of counseling in an urban school or youth center. Selected theories, with

applications for school and agency counseling, and related problems and issues. An introduction to counseling interaction is provided through role-playing and supervised interviews in which study skills and related educational problems are presented. Prerequisite: Ed 441.

445. EDUCATIONAL EVALUATION DESIGN AND METHODS. 4 HOURS. A basic course; theoretical and operational assumptions of different approaches to evaluation. Students work with a range of practical problems in the use of evaluations in various educational settings and assess the advantages and constraints of evaluation data. Prerequisite: Ed 390.

446. EDUCATIONAL MEASUREMENT. 4 HOURS. Design, analysis, and critique of cognitive, affective, and behavioral instruments and techniques for use in educational settings. Each student makes a critical analysis of a published test, constructs a pilot instrument, and performs an item analysis.

447. ANALYSIS OF MULTIVARIATE EDUCATIONAL DATA. 4 HOURS. Introductory multivariate analysis; research design, criticism of applications, and the solution of real and simulated practical problems. Skills are acquired in the use of batch-process computers and desk calculators. Prerequisites: Ed 390, QM 369.

448. INTERNSHIP IN MEASUREMENT AND EVALUATION. 4 HOURS. Internship in the Office of Evaluation and Research, the College of Education. Area majors in measurement and evaluation become involved with evaluation projects in schools and governmental and social service agencies under the supervision of a project director. May be taken in one or two quarters.

449. INTERNSHIP IN COUNSELING URBAN YOUTH. 8 HOURS. Students are assigned to urban schools where they function as assistant counselors. Responsibilities may include tutorial counseling, testing and test interpretation, conferences with staff members and parents, preparing educational and vocational materials, arranging occupational field trips, and developing working relations with community agencies and organizations. Prerequisite: Ed 442.

450. FOUNDATIONS OF SCHOOL ADMINISTRATION. 4 HOURS. Introductory course in urban school administration. Emphasis on the interdisciplinary study of both the theoretical and practical aspects of administration. Prerequisite: Consent of the instructor.

451. ADMINISTRATION PROBLEMS IN URBAN SCHOOLS. 4 HOURS. The school as a social institution and its role in the solution of contemporary social problems. Emphasis on community-school relationship and its effect on school administrators. Prerequisite: Ed 450.

459. INTERNSHIP IN SCHOOL ADMINISTRATION. 8 HOURS. For students enrolled in the master's program in school administration. Students are placed in schools and community agencies to obtain practical knowledge of some of the community-school relationships studied in Education 450 and 451. Prerequisite: Ed 451.

461. BLACK DIALECT AND INSTRUCTIONAL METHODS. 4 HOURS. Contrastive analysis of black dialect and standard English. Specific topics include dialects, historical-social-cultural factors, the black idiom, interference, and methods of teaching standard English. Prerequisite: Ling 305.

462. TEACHING READING TO BLACK AND SPANISH-SPEAKING INNER-CITY STUDENTS. 4 HOURS. Examination of effective methods and materials.

Particular emphasis on the interference of nonstandard language systems and/or Spanish. Section A—teaching black students; Section B—teaching Spanish-speaking students. Prerequisite: Ed 461 or Ling 305.

463.   ANALYSIS OF RESEARCH LITERATURE IN READING. 4 HOURS. Critical analysis of issues in reading and reading instruction with reference to research. A research project is developed. Prerequisites: An introductory statistics course or Ed 390, Ed 360 or the equivalent, and consent of the instructor.

469.   INTERNSHIP IN READING LEADERSHIP. 4 HOURS. Must be taken for two consecutive quarters; 4 hours of credit each quarter. Conducted in a selected school under the supervision of a University faculty member. The student plans and leads reading program development in conjunction with school administration, staff, and parents. A final paper reporting on the development, implementation, and evaluation of the program is required. Prerequisites: 40 hours of the Master of Arts in Urban Education program and consent of the advisers in the area of concentration.

490.   ETHNOGRAPHY OF URBAN EDUCATIONAL INSTITUTIONS. 4 HOURS. Ethnography of an urban educational institution and its interaction with clientele. Ethnographic and microethnographic techniques, including the use of tape recorder and film, are surveyed and practiced in a field study. Reading in cognitive anthropology, organization research, and urban ethnography accompanies the field work. Prerequisites: Ed 400 or the equivalent and consent of the instructor.

491.   PROBLEMS IN URBAN EDUCATION. 4 HOURS. May be repeated up to a total of 8 hours. Same as Urban Planning and Policy 491. Intensive field-oriented study of selected urban educational problems, such as bureaucracy and education, ethnic concern and schools, and educational finance. Emphasis on the collection and analysis of appropriate data.

497.   INDIVIDUAL STUDY. 1 TO 6 HOURS. Students design, implement, and analyze results of a researchable problem in their individual area of concentration. Completed study is reviewed by faculty and peer committees. Prerequisites: Ed 390 or the equivalent and consent of the instructor.

FINANCE

Courses for Graduate and Advanced Undergraduate Students

350.   BUSINESS FINANCE. 4 HOURS. No credit for graduate students in the finance curriculum. The nature of business finance and its relation to economics, accounting, and law; legal nature and forms of business enterprise; capital, capitalization, and financial planning; financial analysis and interpretation; initial financing, refinancing; working capital; income administration, including dividend policies; expansion; internal and external financial and economic relationships of the firm. Prerequisites: Actg 102, Econ 120.

351.   INVESTMENTS. 4 HOURS. Types and distinguishing features of securities, security markets, analysis of financial statements and principles of valuation, quality differences, selection of securities to meet varying personal and institutional objectives. Prerequisites: Fin 350, 360. Business administration students must have declared a major.

352.   INVESTMENT POLICY. 4 HOURS. Varying strategies to meet diverse objectives; investments for individuals, business firms, banks, insurance companies, pension and profit-sharing funds; interrelation of investment policies and the economic environment. Prerequisite: Fin 351. Business administration students must have declared a major.

353.   PROBLEMS IN BUSINESS FINANCE. 4 HOURS. Selected areas in advanced corporate finance, including short-term asset management; capital budgeting under certainty and uncertainty; capital structure and dividend policy and theory; valuation and risk; the structure of capital asset prices and implications of that structure for financial policy of firms. Prerequisite: Fin 350. Business administration students must have declared a major.

354.   SECURITY ANALYSIS. 4 HOURS. Interpretation and analysis of published financial statements for internal control and external evaluation. The financial characteristics of industrial, commercial, financial, transportation, public utility, real estate, and nonprofit institutions. Prerequisite: Fin 351. Business administration students must have declared a major.

360.   MONEY AND BANKING. 4 HOURS. Monetary and banking systems. The Federal Reserve System; monetary theory; international monetary relations; monetary policy in the United States. Prerequisite: Econ 121. Business administration students must have declared a major.

361.   THEORY AND STRUCTURE OF FINANCIAL MARKETS. 4 HOURS. Consumption, saving, and the allocation of resources over time. Financial intermediation and the role of financial markets in allocating funds, absorbing risk, and providing liquidity. Financial institutions, relationship among markets, competition, and public policy. Prerequisite: Fin 360. Business administration students must have declared a major.

372.   FINANCIAL MANAGEMENT IN THE NONPROFIT SECTOR. 4 HOURS. Description, goals, and optimal financial policy in the private and public nonprofit sectors of economics. Cost-benefit analysis, the social opportunity cost of public funds, and illustrative applications. Prerequisites: Fin 350, Econ 319 or 321. Business administration students must have declared a major.

399.   INDEPENDENT STUDY. 2 TO 4 HOURS. May be repeated once for credit. For students in good standing in the College of Business Administration who wish to pursue advanced study in topics related to finance. A written report is required. Prerequisites: 16 hours of upper-division finance, consent of a faculty member and the head of the department.

GREEK

Courses for Graduate and Advanced Undergraduate Students

305.   HOMER: *ILIAD.* 4 HOURS. Reading and translation of extensive selections from the poem. Introduction to Homeric scholarship. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

310.   PINDAR. 4 HOURS. Reading and analysis of selected *Odes.* Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

315.   AESCHYLUS: *AGAMEMNON*. 4 HOURS. Reading and analysis of the play; discussion of the use of myth. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

329.   GREEK SCIENCE. 4 HOURS. Individual conferences on assigned papers are required. Primarily for Greek majors. Examination and interpretation on selected texts illustrative of the classical development of Greek science from 500 B.C. Prerequisite: Any 200-level course in classical Greek.

330.   ARISTOPHANES. 4 HOURS. Reading and translation of at least two plays. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

340.   DEMOSTHENES. 4 HOURS. Reading and analysis of two or more speeches; study of their historical background. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

350.   PLUTARCH. 4 HOURS. Reading and interpretation of one or more of the *Moral Essays* or the *Lives*. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

360.   PLATO: *THE REPUBLIC*. 4 HOURS. Reading and interpretation of selections; analysis of style and thought and of the development of some of the major arguments. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

365.   ARISTOTLE: *NICOMACHEAN ETHICS*. 4 HOURS. Same as Religious Studies 365. Reading and analysis of selections from several books. Sources and problems of Aristotle's ethical writings. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

370.   THUCYDIDES. 4 HOURS. Reading and translation of selections from Thucydides' history of the Peloponnesian War. Sources and problems of Greek historiography. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

380.   HELLENISTIC POETRY. 4 HOURS. Reading and analysis of selections dating from 350 B.C. to A.D. 350. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

381.   GREEK LITERARY CRITICISM. 4 HOURS. Reading and translation of Aristotle's *Poetics* and selections from Longinus' *On the Sublime*. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

382.   GREEK RHETORIC. 4 HOURS. Selected texts illustrative of the Greek contribution to the art of rhetoric; special attention to the *Rhetoric* of Aristotle. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

399.   INDEPENDENT READING. 1 TO 4 HOURS. May be repeated for credit. For Greek majors and graduate students. Independent study under faculty direction. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

HISTORY OF ARCHITECTURE AND ART

Courses for Graduate and Advanced Undergraduate Students

311.   THE ANCIENT CITY. 4 HOURS. The historical development of the city in the ancient Near East, Greece, and the Roman Empire. Prerequisite: Graduate standing in architecture or 8 hours in the history of ancient architecture and art sequence.

320.   THE MEDIEVAL CITY. 4 HOURS. Forms of city plans and urban architecture and their relationship to surrounding cultural and institutional factors. Prerequisite: Arch 242 or 4 hours of history of architecture and art in the medieval area.

323.   GOTHIC SCULPTURE. 4 HOURS. Development of sculpture in northern Europe from 1140 to 1530. Prerequisites: Junior standing and 4 hours in History of Architecture and Art 200-level courses.

325.   SEMINAR ON MEDIEVAL ART. 4 HOURS. Individual conferences on assigned papers are required. Selected problems in the history of medieval art. Series of lectures followed by student reports. Prerequisites: Junior standing and 4 hours in History of Architecture and Art 200-level courses.

331.   SEMINAR ON THE HISTORY OF ARCHITECTURE. 4 HOURS. Selected problems. Prior to registration the student should be advised by the instructor. Prerequisite: 12 hours from HAA 231 through 238.

332.   READINGS IN THE HISTORY OF ARCHITECTURE. 4 HOURS. Individually planned readings on selected topics under the supervision of a faculty member. Prerequisites: 12 hours from HAA 231 through 238 and approval of the instructor and the department.

333.   LITERATURE, THEORY, AND CRITICISM. 4 HOURS. Selected readings and discussion of significant writers on architecture. Prerequisites: 12 hours from HAA 231 through 238 and approval of the instructor and the department.

334.   CHICAGO BUILDING. 4 HOURS. Architectural and technical history of Chicago's commercial buildings from 1871 to the present. Prerequisite: 12 hours from HAA 231 through 238.

335.   WRIGHT AND HIS CONTEMPORARIES, 1890 TO 1910. 4 HOURS. Frank Lloyd Wright's domestic buildings in the Chicago area and his relationship to other members of the Prairie School of Midwest architecture. Lectures, discussions, and field trips. Prerequisite: 12 hours from HAA 231 through 238.

336.   SEMINAR: ADLER AND SULLIVAN. 4 HOURS. Critical study of Chicago's foremost architectural partnership: monuments, theories, and practice. Prerequisites: 12 hours from HAA 231 through 238 and HAA 334.

340.   THE RENAISSANCE AND BAROQUE CITY. 4 HOURS. Forms of city plans and urban architecture in relationship to cultural and institutional characteristics. Prerequisite: Arch 242 or 4 hours of the history of architecture and art Renaissance and baroque sequence.

341.   ART OF THE FIFTEENTH CENTURY IN FLORENCE. 4 HOURS. Stylistic and iconographic studies of the works of the major painters, sculptors, and architects.

Florentine history and literature in their relation to the visual arts. Prerequisites: Junior standing and 4 hours in History of Architecture and Art 200-level courses.

342.   ART OF THE HIGH RENAISSANCE. 4 HOURS. Art of the great Italian centers during the late fifteenth and early sixteenth centuries. Emphasis on Leonardo, Raphael, Bramante, Bellini, Giorgione, and Michelangelo. Prerequisites: Junior standing and 4 hours in History of Architecture and Art 200-level courses.

343.   ITALIAN ART FROM 1520 TO 1600. 4 HOURS. Art of the sixteenth century; emphasis on painting and sculpture. Special attention is given to Correggio, Pontormo, Bronzino, Gianbologna, Michelangelo, Palladio, Titian, and Tintoretto. Prerequisites: Junior standing and 4 hours in History of Architecture and Art 200-level courses.

361.   PROSEMINAR ON MODERN PAINTING. 4 HOURS. May be repeated for credit at the discretion of the department. Selected examples; development and diffusion of style and iconography. Analogies in the history of ideas and events, technical change, and other pertinent material. Prerequisites: Junior standing and 4 hours in History of Architecture and Art 200-level courses.

362.   PROSEMINAR ON MODERN SCULPTURE. 4 HOURS. May be repeated for credit at the discretion of the department. Selected examples; development and diffusion of style and iconography. Analogies in the history of ideas and events, technical change, and other pertinent material. Prerequisites: Junior standing and 4 hours in History of Architecture and Art 200-level courses.

363.   CONTEMPORARY ART. 4 HOURS. The most recent developments in contemporary art, its theories and production. Prerequisites: Junior standing and 4 hours in History of Architecture and Art 200-level courses.

371.   CHINESE LANDSCAPE PAINTING. 4 HOURS. History from the origins to the twentieth century; major trends and figures. Prerequisite: HAA 271 or 12 hours in Asian Studies.

372.   JAPANESE PRINTS. 4 HOURS. History from the fourteenth century to the present; emphasis on Ukiyoe Hanga of the seventeenth to nineteenth centuries. Prerequisite: HAA 272 or the equivalent.

381.   SEMINAR ON AMERICAN ART. 4 HOURS. Individual conferences on assigned papers are required. American artists or movements selected with the permission of the instructor. Prerequisites: Junior standing and 12 hours in History of Architecture and Art 200-level courses.

385.   SEMINAR: FILM ISSUES. 4 HOURS. Individual conferences on assigned papers are required. Studies in genres, schools, individual artists, critics, and theorists of the motion picture. Subject areas are specified by the instructor. Prerequisites: Junior standing and HAA 285, 286.

391.   SPECIAL STUDIES IN THE HISTORY OF ART. 4 HOURS. May be repeated for a maximum of 12 hours. Discussions each quarter of special problems, with attention to a major theme, period, or artist. Student reports are required. Prerequisites: Senior standing, 12 hours in History of Architecture and Art 200- and 300-level courses, and approval of the instructor and the department.

392.   READINGS IN ART HISTORY. 4 HOURS. May be repeated for credit at the discretion of the department. Individually planned readings on selected topics

under the supervision of a faculty member. Prerequisites: Senior standing, 12 hours in History of Architecture and Art courses beyond the 100 level, and approval of the instructor and the department.

393.   HISTORY OF COLLECTING AND MUSEOLOGY. 4 HOURS. Individual conferences on assigned papers are required. The history of collecting and patronage. The scope and operation of public and private collections and museums. Lectures, discussions, and field trips. Prerequisites: Junior standing and HAA 142, 143, 144.

HUMANITIES

Courses for Graduate and Advanced Undergraduate Students

319.   *DON QUIJOTE.* 4 HOURS. Same as Spanish 319. Reading and discussion; emphasis on novelistic technique and development of the novel. Prerequisite: Junior standing.

ITALIAN

Courses for Graduate and Advanced Undergraduate Students

305.   ITALIAN LITERARY MOVEMENTS TO 1450. 4 HOURS. Major developments. Prerequisite: Two 200-level courses in Italian.

306.   ITALIAN LITERARY MOVEMENTS FROM 1450 TO 1600. 4 HOURS. Continues Italian 305. Prerequisite: Two 200-level courses in Italian.

307.   ITALIAN LITERATURE FROM 1600 TO 1800. 4 HOURS. Continues Italian 306. Prerequisite: Two 200-level courses in Italian.

308.   ITALIAN LITERATURE FROM 1800 TO THE PRESENT. 4 HOURS. Continues Italian 307. Prerequisite: Two 200-level courses in Italian.

399.   INDEPENDENT STUDY. 1 TO 6 HOURS. May be repeated for credit. For seniors and graduate students. Independent research on various aspects of Italian culture and studies that are not covered in regular courses. Prerequisite: Consent of the instructor.

LATIN

Courses for Graduate and Advanced Undergraduate Students

301.   *CORPUS CAESARIANUM.* 4 HOURS. For advanced undergraduates, graduates, secondary school teachers of Latin, and prospective teachers. Rapid reading of Latin prose, based on the *Corpus Caesarianum;* discussion of the linguistic, literary, social, and political aspects that contribute to the understanding of the texts read. Prerequisites: Junior or senior standing in Latin, at least one year of Latin beyond Lat 106.

302.   TIBULLUS AND PROPERTIUS. 4 HOURS. Reading and interpretation of selections from their chief elegiac poems. Prerequisite: 4 hours of Latin at the 200 level or the equivalent.

304. SENECA: PROSE WORKS. 4 HOURS. Reading of two or more of the *Moral Essays* and/or a selection of the *Letters.* Prerequisite: 4 hours of Latin at the 200 level or the equivalent.

305. SENECA: TRAGEDIES. 4 HOURS. Reading and interpretation of one or more of the tragedies. Prerequisite: 4 hours of Latin at the 200 level or the equivalent.

306. CICERO: PHILOSOPHIC ESSAYS II. 4 HOURS. Reading of two or more books from among *De Finibus, De Natura Deorum, De Divinatione, Academici;* study of related problems. Prerequisite: One 200-level course in Latin or the equivalent.

308. CICERO: LETTERS. 4 HOURS. Reading and translation of selections of the *Letters to Atticus* and the *Letters to His Friends.* Prerequisite: 8 hours of Latin at the 200 level or the equivalent.

309. VERGIL: *ECLOGUES* AND *GEORGICS.* 4 HOURS. Reading and analysis of selections from Vergil's earlier works. Prerequisite: 8 hours of Latin at the 200 level.

310. PLAUTUS II. 4 HOURS. Advanced studies in Roman comedy and the reading of two or more plays not read in Latin 210. Prerequisite: At least 8 hours of Latin at the 200 level or the equivalent.

340. LUCRETIUS. 4 HOURS. Reading and interpretation of extensive selections from *De Rerum Natura.* Prerequisite: 4 hours of Latin at the 200 level or the equivalent.

348. ST. AUGUSTINE: *THE CONFESSIONS.* 4 HOURS. Same as Religious Studies 348. The autobiographical portions of *The Confessions.* Prerequisite: One 200-level course in Latin.

350. MEDIEVAL LATIN. 4 HOURS. Literary and linguistic study of Latin texts originating between 350 and 1350. Prerequisites: Lat 106, 203 or the equivalent.

351. OVID: ELEGIAC POETRY. 4 HOURS. Reading and analysis of the chief elegiac poems. Prerequisite: 4 hours of Latin at the 200 level or the equivalent.

360. HORACE: *ODES* II AND *EPODES.* 4 HOURS. More extensive study of the *Odes,* with the addition of the *Epodes.* Prerequisite: One 200-level course in Latin.

361. HORACE: *EPISTLES.* 4 HOURS. Reading and interpretation of the *Epistles.* Prerequisite: 8 hours of Latin at the 200 level or the equivalent.

362. JUVENAL: *SATURAE.* 4 HOURS. Selections from the sixteen extant satires. Prerequisite: 8 hours of Latin at the 200 level or the equivalent.

370. TACITUS: *ANNALS* AND *HISTORIES.* 4 HOURS. Intensive study of the early empire and the historiography of Tacitus; extensive reading in the works. Prerequisite: At least 8 hours in Latin at the 200 level or the equivalent.

381. ROMAN LITERARY CRITICISM. 4 HOURS. The principal contributions of Latin writers to the study of literature. Prerequisite: At least 12 hours of Latin at the 200 level or the equivalent.

382. ROMAN RHETORIC. 4 HOURS. The contributions of writers in Latin to the study and practice of rhetoric. Prerequisite: At least 12 hours of Latin or the equivalent.

384. ROMAN SATIRE. 4 HOURS. Study of the definition, development, and problems of the genre through selections from the principal writers of satire. Prerequisite: 8 hours of Latin at the 200 level or the equivalent.

390. THE TEACHING OF LATIN IN THE SECONDARY SCHOOL. 4 HOURS. Theory and practice in foreign language instruction as they apply specifically to teaching Latin at the secondary level; objectives of instruction in Latin, historical perspectives, texts, and materials of instruction; preprofessional orientation. Prerequisite: At least 8 hours of Latin at the 300 level or approval of the department.

LATIN AMERICAN STUDIES

Courses for Graduate and Advanced Undergraduate Students

308. SPANISH-AMERICAN LITERATURE TO 1888 I. 4 HOURS. Same as Spanish 308. Development from the sixteenth century through the end of the Romantic period. Prerequisite: LASt 223 or 224 or the equivalent.

309. SPANISH-AMERICAN LITERATURE TO 1888 II. 4 HOURS. Same as Spanish 309. Continues Latin American Studies 308. Prerequisite: LASt 223 or 224.

310. *MODERNISMO* AND CONTEMPORARY SPANISH-AMERICAN POETRY I. 4 HOURS. Same as Spanish 310. Spanish-American poetry from 1888 to the present with some *Modernista* prose. Prerequisite: LASt 223 or 224.

311. *MODERNISMO* AND CONTEMPORARY SPANISH-AMERICAN POETRY II. 4 HOURS. Same as Spanish 311. Continues Latin American Studies 310. Prerequisite: LASt 223 or 224.

315. ADVANCED TOPICS IN BRAZILIAN LITERATURE. 4 HOURS. May be repeated for credit. Same as Portuguese 315. Topics related to various aspects of Brazilian literary history and Brazilian writers. Topics vary from quarter to quarter. Prerequisite: Port 215.

323. THE CONTEMPORARY SPANISH-AMERICAN NOVEL I. 4 HOURS. Same as Spanish 323. From the Romantic period to 1930. Prerequisite: LASt 223 or 224 or the equivalent.

324. THE CONTEMPORARY SPANISH-AMERICAN NOVEL II. 4 HOURS. Same as Spanish 324. Continues Latin American Studies 323. From 1930 to the present. Prerequisite: LASt 223 or 224.

354. PROBLEMS IN MESOAMERICAN ETHNOLOGY. 4 HOURS. Same as Anthropology 361. Intensive investigation of selected problems from the Mesoamerican area; special emphasis on religion, economics, and social organization. Prerequisite: LASt 254.

361. TOPICS IN LATIN AMERICAN HISTORY. 4 HOURS. May be repeated for credit. Same as History 361. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

367. PROBLEMS IN SOUTH AMERICAN ETHNOLOGY. 4 HOURS. Same as Anthropology 367. Intensive reading and research on theoretical and ethnographic problems in South American Indian social structures and cultures. Special attention to the influence of Lévi-Strauss's ideas on the formulation of cultural theory in South America. Prerequisite: Graduate standing or Anth 213 and LASt 255.

381. SEMINAR: POLITICAL PROBLEMS OF DEVELOPING SOCIETIES. 4 HOURS. May be repeated to a maximum of 12 hours if the subject matter is different for each registration. Same as Political Science 381. Selected aspects of the politics of the countries of Asia, Africa, and Latin America. Prerequisites: PolS 100, 200, 232. Additional prerequisites may be stipulated depending on the subject matter of the seminar.

390. TOPICS IN LUSO-BRAZILIAN LITERATURE. 4 HOURS. May be repeated for credit. Same as Portuguese 390. Topics related to various aspects of the Luso-Brazilian language, literature, and culture. Topics vary from quarter to quarter. Prerequisite: Consent of the instructor.

391. INTERDISCIPLINARY SEMINAR ON LATIN AMERICAN STUDIES I. 4 HOURS. Specific topics are announced each quarter. Prerequisite: Latin American studies major.

392. INTERDISCIPLINARY SEMINAR ON LATIN AMERICAN STUDIES II. 4 HOURS. Specific topics are announced each quarter. Prerequisites: Latin American studies major and LASt 391.

393. INTERDISCIPLINARY SEMINAR ON LATIN AMERICAN STUDIES III. 4 HOURS. Specific topics are announced each quarter. Prerequisites: Latin American studies major and LASt 392.

LITHUANIAN

Courses for Graduate and Advanced Undergraduate Students

331. HISTORY OF THE LITHUANIAN LANGUAGE. 4 HOURS. Development of Lithuanian from its Indo-European origins to the formation of the standard language; the conservative aspects of Lithuanian and its relation to Slavic. Prerequisite: 24 hours of Lithuanian or the equivalent or Ling 305.

332. STRUCTURE OF LITHUANIAN. 4 HOURS. Synchronic analysis of the structure of standard Lithuanian; reference to its historical development. Prerequisite: 24 hours of Lithuanian or the equivalent or Ling 305.

MANAGEMENT

Courses for Graduate and Advanced Undergraduate Students

330. ORGANIZATIONAL PSYCHOLOGY. 4 HOURS. Same as Psychology 330. Individual psychological and group processes and their interaction with organizational structure. Behavioral factors in effective organizational change. Prerequisite: Graduate standing or Psch 230 and one course in social psychology or the equivalents.

333. MOTIVATION AND MORALE IN INDUSTRY. 4 HOURS. Same as Psychology 333. Concepts and methods in the assessment and modification of employee motivation, attitudes, and morale. Prerequisite: Graduate standing or 12 hours of psychology, including Psch 332 or the equivalent.

335. PSYCHOLOGY IN INDUSTRIAL TRAINING. 4 HOURS. Same as Psychology 335. Psychological measurement techniques in assessing training needs and evaluating training effectiveness. Application of psychological techniques to the development of industrial training programs. Prerequisite: Graduate standing or Psch 332 or the equivalent.

338. PSYCHOLOGY OF INDUSTRIAL CONFLICT. 4 HOURS. Same as Psychology 338. Behavioral analysis of the causes, dimensions, and modes of resolution of industrial conflict; special emphasis on labor-management relations. Prerequisite: Graduate standing or Mgmt 330 or the equivalent.

340. ORGANIZATION THEORY I. 4 HOURS. Important theories of organization; their foundation, application, and consequences in the attainment of individual and management objectives. Focus on formal and informal aspects of organizations, authority relationships, and structural aspects. Prerequisite: Econ 120 or the equivalent.

345. ORGANIZATION THEORY II. 4 HOURS. An analytical, in-depth study of organizational theories, their development of empirical evidence for organization development practices, and their implications for management of various organizational and management theories. Prerequisite: Mgmt 340. Business administration students must have declared a major.

352. ADMINISTRATION PRACTICES. 4 HOURS. Executive and manager behavior in working organizations. Analysis of human problems and relationships at work. Leadership styles, problems of motivation and attitudes. Emphasis on behavioral sciences theory and technology as applied to business. Case method of analysis and study. Prerequisite: Econ 340. Business administration students must have declared a major.

353. MANPOWER MANAGEMENT. 4 HOURS. The subsystems of manpower planning, recruitment and selection, training and development, position control, audit and evaluation, salary and benefit administration that comprise the manpower function of all organizations. Emphasis on the role of these activities as services and support-control systems. Prerequisite: Junior standing. Business administration students must have declared a major.

354. UNION-MANAGEMENT RELATIONS. 4 HOURS. Analysis of union impact on the management of organizations, including structures and functions of unions, collective bargaining as a decision-making process, government regulation of union-management relations, public policy issues, and alternative union-management relations systems. Prerequisite: Junior standing. Business administration students must have declared a major.

355. OPERATIONS AND SYSTEMS MANAGEMENT I. 4 HOURS. Application of management sciences to the planning and design of operational systems. Emphasis on strategic planning, selection of objectives, forecasting of and response to changing technology and system controls. Prerequisite: QM 270 or the equivalent.

356. OPERATIONS AND SYSTEMS MANAGEMENT II. 4 HOURS. Application of managerial sciences to operations and control of operational systems. Emphasis on systems operations facilities, systems standards and information flow, system

maintenance, and the behavioral interface and system control. Prerequisite: Mgmt 355 or the equivalent. Business administration students must have declared a major.

357.   OPERATIONS AND SYSTEMS MANAGEMENT III. 4 HOURS. Emerging concepts in management science. Managerial applications of computer technology and utilization and related electronic data processing. Applications of quantitative methods to information and control methods and systems. Process and systems design. Prerequisite: Mgmt 356.

359.   BUSINESS POLICY. 4 HOURS. The formulation and implementation of policies that determine the long-term character and performance of business firms. Problems in policy are analyzed from the vantage point of top management rather than from the limited view of a functional specialist. Through written analysis, classroom discussion of cases, and experience in management simulation the students are exposed to a wide variety of top management problems. The topics and cases covered are also appropriate for students interested in the management of public institutions. Prerequisite: Graduating senior in the College of Business Administration.

360.   BUSINESS, SOCIETY, AND TECHNOLOGY. 4 HOURS. Business and the corporate role in a complex, technological society. Emphasis on the historical evolution of business; the many relationships of the corporation to its external environment; urban problems of business; the impact of the corporation on individual and group behavior. Prerequisite: Mgmt 340. Business administration students must have declared a major.

361.   COMPARATIVE STUDY OF ORGANIZATIONS. 4 HOURS. The significant differences in organizations; the importance of these differences for the operation, management, and design of organizations. Prerequisite: Mgmt 340. Business administration students must have declared a major.

363.   COLLECTIVE BARGAINING. 4 HOURS. Intensive examination of the structure and conduct of collective bargaining: the determination of the bargaining unit and bargaining representative; the negotiation and scope of contracts; the administration of contracts; the major substantive issues in negotiations; the procedures for resolving industrial conflict. Prerequisites: Mgmt 353, 354.

364.   LABOR LAW AND NATIONAL LABOR POLICY. 4 HOURS. The evolution of national labor policy considered within a framework of labor legislation, court decisions, and administrative rules. Problems of effectuating labor agreements; problems of protecting individual employee rights in a collective bargaining context. Introduction to the legal and constitutional problems of government regulation of industrial and labor relations. Prerequisite: Mgmt 354.

365.   COMPENSATION SYSTEMS. 4 HOURS. Lecture and discussion of current compensation issues and problems. Topics include the psychology of money motivation, the current status of wage and salary administration, wage criteria, methods and techniques of job evaluation and job analysis, determination of pay grades and ranges, employee benefits and services, employee incentives, and special compensation issues. Prerequisite: Mgmt 353 or 354. Business administration students must have declared a major.

366.   TECHNOLOGICAL FORECASTING. 4 HOURS. The methodology of forecasting the impact of technological change on the managerial process; emphasis on selection of goals and parameters, relevance of figures of merit, and various

forecasting methodologies. Prerequisite: Mgmt 355 or the equivalent. Business administration students must have declared a major.

367.   IMPACT OF TECHNOLOGICAL CHANGE. 4 HOURS. The impact of technological change on the business environment and the managerial process; emphasis on alternative futures and planning to attain desired ends. Prerequisite: Mgmt 366.

371.   MANAGEMENT AND ORGANIZATION DEVELOPMENT. 4 HOURS. Alternative strategies and methods for developing and increasing the creativity, flexibility, and productivity of the organization and its management personnel. Topics include the role of manpower development and structure in the organization's long-range plan, the role of interventionists, management consultants and centralized training and development departments, the systems view and the development function, traditional and contemporary development philosophies and techniques, criteria selection and evaluative research, and the framework for successful organization development and change. Readings, examples, and case studies from the public and private sector. Prerequisite: Mgmt 340. Business administration students must have declared a major.

373.   COLLECTIVE BARGAINING IN PUBLIC EMPLOYMENT. 4 HOURS. Practices and legislation pertaining to union-management relations at the federal, state, and local levels of government. Procedural and policy issues confronting public employees, union officials, and government administrators. Prerequisite: Junior standing. Business administration students must have declared a major.

374.   COMPARATIVE INDUSTRIAL RELATIONS SYSTEMS. 4 HOURS. Analysis of industrial relations structures, problems, and experiences in selected countries. Common and contrasting features of industrial relations systems are related to national economic, political, and social characteristics. The implication for management and economic development of differences among industrial relations systems. Prerequisite: Mgmt 354.

380.   TRANSPORTATION SYSTEMS MANAGEMENT. 4 HOURS. Problems and practices, including the impact of public policy, capital facilities, industry structure, operations pricing, and environmental relationships. Prerequisites: Econ 120, 121, Mgmt 355. Business administration students must have declared a major.

381.   MANAGERIAL LOGISTICS. 4 HOURS. The management of all activities governing the physical flow of raw materials and finished goods through stages of production to points of final consumption. Key areas include design of logistics systems, transportation location theory, inventory control, and the use of mathematical techniques in solving problems of logistics management. A logistics system computer simulation game is used. Prerequisites: Econ 319 or 321, Mgmt 355. Business administration students must have declared a major.

382.   URBAN MASS TRANSPORTATION SYSTEMS MANAGEMENT. 4 HOURS. Managerial, economic, and environmental aspects, including development of urban transit, federal role in financing urban transit, labor relations, pollution and social benefits, marketing urban transit, congestion, peaking problems, and unique management problems. Prerequisites: Mgmt 340, 355. Business administration students must have declared a major.

383.   TRANSPORTATION AND PUBLIC POLICY. 4 HOURS. Same as Economics 383. The relationship between government and transportation in the United

States. Topics include the evolution of transport policy, problems in transport regulation, and current issues in public policy. Prerequisite: Mgmt 380. Business administration students must have declared a major.

399.   INDEPENDENT STUDY. 2 TO 4 HOURS. May be repeated once for credit. Advanced independent study in approved topics related to management. A written report prepared under the guidance of a major professor is required. Prerequisites: 16 hours of upper-division management courses and consent of the head of the department. Business administration students must have declared a major.

Courses for Graduate Students

451.   ORGANIZATION THEORY. 3 TO 4 HOURS. Classical and modern theories of organization. Organization structure and processes, line and staff relationships, management controls, managerial decision-making, organizational objectives and restraints, management functions, formal and informal organization, bureaucracy, and behavioral sciences concepts. Prerequisite: Mgmt 350.

452.   ADMINISTRATIVE PRACTICES. 3 TO 4 HOURS. Analysis of human problems in management and organization. Dynamics of leadership in the working organization, group dynamics, administrative behavioral patterns, administrative inplications of decision-making and policy formulation, and other relevant behavioral sciences concepts. Prerequisite: Mgmt 451.

453.   PERSONNEL MANAGEMENT. 4 HOURS. Manpower management programs and policies. Staffing, training and development, historical evolution of personnel policies, modern labor force and technological trends, supervision, wage and salary administration, and manpower research and utilization. Prerequisites: Mgmt 350 or the equivalent, Mgmt 451.

455.   OPERATIONS AND SYSTEMS MANAGEMENT. 4 HOURS. Basic principles and procedures for effective utilization of productive factors in a working organization. Facilities design, control systems, data processing, scheduling, automation, statistical analysis, computer technology, production planning, process design, and other relevant management science concepts. Prerequisites: QM 470, 471.

457.   SEMINAR ON INTERNATIONAL BUSINESS. 4 HOURS. Management practices and problems in major nations. Legal and cultural factors affecting managerial policies and decisions; organization planning and manpower utilization; comparative management systems and ideologies. Prerequisite: Mgmt 451.

458.   SEMINAR ON BUSINESS POLICY AND DECISION THEORY. 4 HOURS. To be taken in the final quarter of the student's degree program. A capstone course to integrate all the functional areas of business: policy formulation and administration, policy and decision implementation, long-range planning, control techniques, factor analysis and decision-making in an uncertain environment, quantitative techniques, simulation and case exercises, and study of actual business firms.

459.   BUSINESS AND SOCIETY. 4 HOURS. Historical background of American business systems and institutions; conflicts between business and economic groups; problems of social groups seeking specified goals in a pluralistic society. Prerequisite: Mgmt 350.

MARKETING

Courses for Graduate and Advanced Undergraduate Students

360.   PRINCIPLES OF MARKETING. 4 HOURS. Required of all students in the College of Business Administration. The workings of the marketing system and the way in which marketing decisions are made.

361.   CONSUMER MARKET BEHAVIOR. 4 HOURS. Motivations underlying market behavior of consumers, producers, middlemen; drives, emotions, desires, learning, memory; effects of demographic characteristics, social status, and reference groups on marketing action. Prerequisite: Mktg 360. Business administration students must have declared a major.

362.   MARKETING RESEARCH AND INFORMATION SYSTEMS. 4 HOURS. The gathering and interpretation of information used in solving marketing problems; pertinent modern research techniques from mathematics and the behavioral sciences are employed in developing an analytical structure. Prerequisites: Mktg 361, QM 272 or the equivalents. Business administration students must have declared a major.

363.   MARKETING ORGANIZATION. 4 HOURS. Principles underlying the development of an integrated distribution system; its relationship to the marketing structure of the firm; evaluation of decisions on raw material sources, plant and warehouse location, wholesale and retail outlets; analysis of the movement of products through marketing channels. Prerequisite: Mktg 360. Business administration students must have declared a major.

364.   MANAGING MARKETING COMMUNICATIONS. 4 HOURS. Analysis of communication information among producers, middlemen, and consumers for marketing purposes; managerial problems in directing a firm's promotional efforts; personal selling, advertising, sales promotion, public relations. Prerequisite: Mktg 360. Business administration students must have declared a major.

365.   MARKETING MANAGEMENT. 4 HOURS. Seminar. Building marketing programs to implement the achievement of marketing objectives. Individual and group research and presentation from the viewpoint of major marketing executives of the firm; business case analysis. Prerequisite: 20 hours of marketing. Business administration students must have declared a major.

366.   COMPARATIVE MARKETING SYSTEMS. 4 HOURS. An advanced course. The structures and processes of domestic marketing systems in other countries in a framework of comparative cultural, political, economic, and social systems. Prerequisite: Mktg 360. Business administration students must have declared a major.

367.   MANAGEMENT SCIENCE IN MARKETING. 4 HOURS. Introduction to management science concepts and techniques used in the analysis and solution of marketing management problems in areas of advertising, pricing, product planning, personal selling, and distribution through the study of actual applications. Prerequisites: Mktg 360, QM 272. Business administration students must have declared a major.

368.   PROBLEMS IN MARKETING RESEARCH AND INFORMATION SYSTEMS. 4 HOURS. An advanced course. Pertinent marketing research and information

problems and techniques are used to solve an actual marketing problem. Prerequisite: Mktg 362. Business administration students must have declared a major.

370. THE SOCIAL AND LEGAL ENVIRONMENT OF BUSINESS. 4 HOURS. The major social and legal forces that are environmental to the firm. Focus on early detection of those forces, defining their relationship to each other and to the firm, and how decision-making in the firm is affected. Prerequisite: Junior standing.

390. SPECIAL TOPICS IN MARKETING. 4 HOURS. Intensive study of selected problems. Reading assignments are drawn from scholarly and professional journals; emphasis on covering relatively few areas in great depth. Prerequisite: Business administration students must have declared a major.

399. INDEPENDENT STUDY IN MARKETING. 1 TO 12 HOURS. May be taken for a total of 12 hours. Intensive study of one or more selected topics. The topic and research methodology is determined in consultation with the instructor. Prerequisites: Major in marketing and consent of the head of the department.

Courses for Graduate Students

400. PRINCIPLES OF MARKETING. 4 HOURS. Theory and practice in the formulation of marketing decisions; planning, pricing, and promotion; distribution of goods and services to all types of consumers.

460. MARKETING MANAGEMENT. 4 HOURS. The structural system for the management of marketing; environmental considerations; goal determination; the sequential process; marketing planning; product-market integration; channel components; demand stimulation; evaluation and audit. Prerequisite: Mktg 400.

461. CONSUMER BEHAVIOR. 4 HOURS. Application of knowledge from the behavioral sciences to the study of consumer behavior. Individual, group, and cultural influences on consumer preferences and purchasing patterns. Emphasis on both theory and application; the advantages and limitations of this approach. Prerequisite: Mktg 460.

463. INFORMATION FOR MARKETING DECISIONS. 4 HOURS. Problem definition and the selection of appropriate research techniques for the solution of specific marketing problems; design of the research project, administration of research, and special problems in marketing research. The establishment and administration of information systems to provide the firm with a systematic, continuing appraisal of its market position. Prerequisite: Mktg 461.

465. MARKETING COMMUNICATION AND PROMOTIONAL STRATEGY. 4 HOURS. The ways in which a firm uses advertising, public relations, sales promotion, and personal selling to communicate with its customers. The functional characteristics of each of these is assessed in terms of varying marketing situations in the process of formulating the firm's strategy. Prerequisite: Mktg 463.

466. PERSPECTIVES IN CONSUMERISM. 4 HOURS. Review of current developments in consumer protection. Events leading to the emergence of the consumer movement, its current status with respect to the right of consumers to be protected against ineffective or unsafe products, and the effectiveness of consumer protection measures. Prerequisite: Mktg 400.

467.   MARKETING PROBLEMS OF SMALL BUSINESS. 4 HOURS. The unique marketing management and operating problems of small business and its possibilities. Small businesses are viewed as institutions that are qualitatively different from large businesses and have potential for urban economic development. Prerequisite: Mktg 460 or the equivalent.

468.   MARKETING IN THE INNER CITY. 4 HOURS. In-depth study of marketing problems in the inner city and proposed solutions to these problems. The inner city marketplace viewed as a system whose improvement requires interrelated actions by the various individuals and organizations who are or should be involved in it. Prerequisite: Mktg 460 or the equivalent.

MUSIC

Courses for Graduate and Advanced Undergraduate Students

300.   EIGHTEENTH-CENTURY COUNTERPOINT. 3 HOURS. Middle to late Baroque music. Analysis of representative scores and written assignments in eighteenth-century contrapuntal style. Prerequisites: Mus 203 and 206 or approval of the department.

301.   SIXTEENTH-CENTURY COUNTERPOINT. 3 HOURS. Late Renaissance music. Analysis of representative scores and written assignments in sixteenth-century contrapuntal style. Prerequisite: Mus 300 or approval of the department.

302.   FORM AND ANALYSIS. 3 HOURS. The melodic, rhythmic, harmonic, and structural analytic procedures of traditional musical form. Analysis or representative scores from the eighteenth to the twentieth centuries. Prerequisite: Mus 301.

303.   COMPOSITIONAL TECHNIQUES OF THE TWENTIETH CENTURY. 4 HOURS. European and American twentieth-century music. Analysis of representative scores and written assignments in composition in one or more of the several contemporary idioms. Prerequisite: Mus 302.

320.   PROSEMINAR ON MUSIC. 2 TO 4 HOURS. May be repeated for credit for a maximum of 12 hours. Selected topics for intensive study in specialized areas of musicology or music theory. Prerequisite: Senior standing as a music major.

330.   MUSIC AS EXPERIENCE. 4 HOURS. The musical experience as found in the writing of theorists, composers, musicians, historians, critics, and philosophers. Prerequisites: Junior standing, Mus 130, and one 200-level course in music.

PHYSICAL EDUCATION

Courses for Graduate and Advanced Undergraduate Students

300.   ADMINISTRATIVE THEORY AND PRACTICE IN PHYSICAL EDUCATION. 4 HOURS. A theoretical approach to the development of administrative thought as it relates to physical education; emphasis on the understanding of concepts and models from the social sciences and their implications for leadership in the educational setting; development of a personal philosophy of administration. Prerequisite: PE 279.

301.   EVALUATION IN PHYSICAL EDUCATION. 4 HOURS. The availability and value of evaluative tools in physical education; methods for administration of

evaluative techniques; analysis of interpretation and use of the results from evaluative techniques; description of the construction of new evaluative instruments employed in physical education. Prerequisite: PE 251.

302. SYNTHESIS OF HUMAN MOVEMENT CONCEPTS. 4 HOURS. Integration of selected concepts from biomechanics, exercise physiology, psychology, and sociology as they apply to the development of meaningful human movement. Prerequisites: Senior standing and consent of the instructor.

303. INSTRUCTIONAL TECHNIQUES IN PHYSICAL EDUCATION. 4 HOURS. Theory and practice; special emphasis on the application of motor learning research to instructional techniques and teaching styles. Prerequisites: Senior standing and consent of the instructor.

305. SPECIAL PROJECTS IN PHYSICAL EDUCATION. 2 TO 4 HOURS. Independent research on special projects. Prerequisite: Approval of the student's project by a graduate faculty member.

306. THE SPORT AND PLAY OF AMERICA. 4 HOURS. The creation, importation, and derivation of sport and play in America; course of development and adaptation to the nature of American life; impact of the political, economic, cultural, and geographical factors on the character of sport and play. Special emphasis on sport and play in urban America. Prerequisite: PE 252.

308. ADAPTED PHYSICAL EDUCATION PROGRAMS. 4 HOURS. Organization and administration; content selection, screening techniques, and instructional design with application of kinesiological, sociological, and psychological principles to the needs of atypical students. Prerequisite: PE 253.

312. PSYCHOLOGY AND PHYSICAL ACTIVITY. 4 HOURS. The study and application of psychological concepts concerning perceptual-motor emotions, motivation, motor learning, and group dynamics in the physical education process. Prerequisites: Senior standing, PE 278.

313. CURRICULUM CONSTRUCTION IN PHYSICAL EDUCATION. 4 HOURS. Principles of curriculum development and evaluation; analysis of age characteristics, needs, interests, and goals of students in a variety of community settings and their implications for the curriculum; development of psychomotor behavioral objectives for curricular offerings for various learning groups. Prerequisite: Ed 230.

331. PROBLEMS AND TRENDS IN URBAN RECREATION. 4 HOURS. Identifying and collecting information for a better understanding of the major problems and issues in urban recreation and leisure science. Prerequisite: Baccalaureate or senior standing and consent of the instructor.

333. EVALUATION TECHNIQUES IN RECREATION. 4 HOURS. Research in the field of recreation; methods and techniques in determining needs and interests for urban recreation and leisure services. Prerequisite: Baccalaureate or senior standing and consent of the instructor.

370. PHILOSOPHY OF PHYSICAL EDUCATION. 4 HOURS. Historical development of the philosophies of physical education and the assumptions on which current professional philosophies rest. Theory of knowledge in physical education.

Courses for Graduate Students

405.   SUPERVISION OF THE PHYSICAL EDUCATION PROGRAM. 4 HOURS. Theory, practices, and processes for effective supervision of the teaching-learning environment in physical education. Prerequisite: PE 278.

431.   LEISURE IN THE URBAN COMMUNITY. 4 HOURS. Readings and research in leisure concepts, the urban environment, and the interrelationship for urban leisure service. Prerequisite: Knowledge of research techniques.

PORTUGUESE

Courses for Graduate and Advanced Undergraduate Students

314.   ADVANCED TOPICS IN BRAZILIAN LITERATURE. 4 HOURS. May be repeated for credit. Same as Latin American Studies 315. Topics related to various aspects of Brazilian literary history and Brazilian writers. Topics vary from quarter to quarter. Prerequisite: Port 215.

390.   TOPICS IN LUSO-BRAZILIAN LITERATURE. 4 HOURS. May be repeated for credit. Same as Latin American Studies 390. Topics related to various aspects of Luso-Brazilian language, literature, and culture. Topics vary from quarter to quarter. Prerequisite: Consent of the instructor.

399.   INDEPENDENT STUDY. 1 TO 6 HOURS. May be repeated for credit. For graduate students who wish to do independent research on various aspects of Luso-Brazilian studies. Prerequisite: Consent of the instructor.

RELIGIOUS STUDIES

Courses for Graduate and Advanced Undergraduate Students

300.   MYTHOLOGY IN ROME. 4 HOURS. Same as Classics 348. The conscious assimilation and adaptation of Greek mythology in Rome; investigation of the concept of mythology. Prerequisite: Cl 248.

304.   SEVENTEENTH-CENTURY RATIONALISM. 4 HOURS. May be repeated once for credit with the approval of the department. Same as Philosophy 304. Careful readings of the works of one or more of the rationalist philosophers, such as Descartes, Spinoza, and Leibniz. Prerequisite: Junior standing or two courses in philosophy.

312.   GEOGRAPHY OF RELIGIONS. 4 HOURS. Same as Geography 312. Systematic treatment of geographical manifestations of the major religious systems of the world. Special attention to the geographical origins and dispersal mechanisms of religious systems and to the manner in which man organizes his life within the framework of his belief. Intensive study of applications being made in the geographical inquiry of religious systems. Prerequisites: Geog 190, 210.

315.   COMPARATIVE RELIGIOUS MOVEMENTS. 4 HOURS. Same as Anthropology 315. Analysis of religious behavior; special reference to the emergence of messianic cults in Africa and among North American Indians and New World Negroes. Prerequisites: Junior standing, 8 hours of either social anthropology or sociology, and consent of the instructor.

332.   TOPICS IN ETHICS AND VALUE THEORY. 4 HOURS. Same as Philosophy 332. Intensive treatment of one or more topics, such as the analysis of moral judgments, the classification of ethical theories according to their formal properties, the thesis of ethical relativism, and the comparison between ethical and scientific theories. Prerequisite: Phil 218 or two courses in philosophy, one of which must be a 200-level course.

348.   ST. AUGUSTINE: *THE CONFESSIONS.* 4 HOURS. Same as Latin 348. The autobiographical portions of *The Confessions.* Prerequisite: One 200-level course in Latin.

350.   MILTON. 4 HOURS. Same as English 315. A survey of Milton's poetry and prose, with emphasis on his major works. Prerequisite: Senior standing or 12 hours of English (Engl 150, 151, 152 recommended).

365.   ARISTOTLE: *NICOMACHEAN ETHICS.* 4 HOURS. Same as Greek 365. Reading and analysis of selections from several books. Sources and problems of Aristotle's ethical writings. Prerequisite: 8 hours of classical Greek at the 200 level or the equivalent.

395.   TOPICS IN RELIGIOUS HISTORY. 4 HOURS. May be repeated for credit. Same as History 395. Specific topics are announced each quarter. Prerequisite: 4 hours of history.

398.   THE PROBLEM OF JUSTICE. 4 HOURS. Same as Criminal Justice 398 and Political Science 398. The premodern view of justice, Plato's or Aristotle's; the modern understanding of justice, such as Hobbes' or Locke's, which is the foundation of the modern political regime; Rousseau's seminal political thought on justice, which is the basis for a variety of reforms and alternatives offered to Hobbes' and/or Locke's political regime. Prerequisite: Two courses in political science, including PolS 150 or 151.

SYSTEMS ENGINEERING

Courses for Graduate and Advanced Undergraduate Students

307.   CYBERNETICS I. 4 HOURS. Same as Information Engineering 307. Introduction to artificial intelligence and pattern recognition by computer. Programs for playing games, proving theorems, answering questions, and making medical diagnoses. Property selection and decision-making techniques. Prerequisites: Math 195 and either 250 or 370.

315.   DYNAMIC SYSTEMS ANALYSIS I. 4 HOURS. Mathematical modeling of systems described by ordinary differential and difference equations with application to engineering and sociotechnological systems. Matrix transfer function forms for interacting systems. The Laplace and Z transform methods as applied to specific problems. Solutions for elementary topologies using computer simulations as laboratory experiments. Prerequisites: InfE 210, Math 195.

316.   DYNAMIC SYSTEMS ANALYSIS II. 4 HOURS. Computer and analytical modeling of inherently or topologically nonlinear sociotechnological systems. Stability analysis. Systems with transport delays. One- and two-dimensional distributed models. Laboratory simulation of particular systems. Prerequisite: SysE 315.

335. URBAN SYSTEMS I. 4 HOURS. Transportation in metropolitan areas, application of the systems approach to transportation, urban development forecast models, urban transportation forecast models, data collection procedures for determining urban travel behavior. Prerequisites: SysE 342 or Soc 201 and Math 112; Econ 321 or 120.

336. URBAN SYSTEMS II. 4 HOURS. Analysis of techniques used in urban systems engineering; emphasis on urban transportation systems and evaluation methodologies for selection of alternative urban system designs. Prerequisites: SysE 335, 371, QM 369.

337. URBAN TRANSPORTATION MODELS. 4 HOURS. Specific models used in urban transportation studies; structuring transportation model sets including data management needs and legal constraints. Prerequisites: SysE 335, 371, QM 369.

338. URBAN TRANSPORTATION SYSTEMS PLANNING. 4 HOURS. Evolution of transportation planning studies and their methodologies, continuing planning studies, additional planning models. Term planning project. Laboratory. Prerequisites: SysE 337, QM 371.

341. MAN-MACHINE SYSTEMS. 4 HOURS. Same as Bioengineering 341. Specific system areas in which the role of man in the system operation requires a systematic analysis of the human component in the system. Critical concepts, variables, and techniques involved in optimum design of human operated systems. Laboratory experiments on man-machine interactions. Prerequisite: SysE 315.

342. EXPERIMENTAL DESIGN. 4 HOURS. Fundamental concepts of statistical analysis. Introduction to standard experimental designs and their associated application in the statistical interpretation of research data and design of engineering systems. Completely random designs, randomized block designs, Latin squares, covariance analysis, and factorial experience. Prerequisites: Math 195, 220.

345. MODELING IN SOCIOTECHNOLOGICAL SYSTEMS. 4 HOURS. Theory and practice; static and dynamic systems, continuous and discrete models, stochastic and deterministic modeling, principles of megasystems. Simulation laboratory. Prerequisites: SysE 225, 342.

350. STOCHASTIC PROCESSES. 4 HOURS. Description and analysis of probabilistic systems; recurrent event models, Markov processes, and queuing systems; digital computer simulation of stochastic processes in sociotechnological systems; applications to specific engineering systems. Prerequisite: SysE 342.

365. INDUSTRIAL ENGINEERING METHODS. 4 HOURS. Structure and theory of industrial organization; sales forecasting; investment analysis; plant layout and materials handling; methods analysis; work measurement systems; wage incentives and labor relations; industrial planning and policy development. Prerequisite: SysE 342.

366. INDUSTRIAL ENGINEERING CONTROLS. 4 HOURS. Microanalysis of industrial processes; quality control; inventory theory; production planning and control; man-machine scheduling models; assembly line balancing; reliability models. Prerequisite: SysE 342.

367. INDUSTRIAL SYSTEMS SIMULATION. 4 HOURS. The solution of industrial problems by means of computer simulation. Simulation strategies. Planning an

industrial simulation experiment. In-depth study of some simulation programming languages as they apply to industrial problems and general examination of their usefulness. Major industrial simulation project. Prerequisite: SysE 342.

368. INDUSTRIAL SYSTEMS OPERATIONS. 4 HOURS. Industrial plant organization and labor administration. Industrial engineering as a staff function. Value engineering. Clerical systems analysis. Building automation systems. Industrial engineering in the service industries. Course project. Prerequisite: SysE 367.

371. OPTIMIZATION TECHNIQUES I. 4 HOURS. Linear programming models, simplex method, sensitivity analysis, transportation problems, duality. Nonlinear programming models, separable objective function, geometric programming, Kuhn-Tucker equations, quadratic programming. Prerequisites: Math 195, 220.

372. OPTIMIZATION TECHNIQUES II. 4 HOURS. Dynamic programming. Optimal control theory; Bellman, Hamilton-Jacobi, and Euler-Lagrange equations; Pontryagin's maximum principle. Applications of optimization techniques to socio-technological models and engineering systems. Simulation laboratory using examples of actual systems. Prerequisites: Math 195, 220.

373. OPTIMIZATION TECHNIQUES III. 4 HOURS. Determination of optimum strategies to solve probabilistic engineering problems. Use of random experiments to improve engineering decisions. Solution of multistage decision problems. Game theory. Prerequisite: SysE 342.

391. SEMINAR. 1 TO 4 HOURS. May be repeated. Topics to be arranged. Prerequisite: Consent of the instructor.

393. SPECIAL PROBLEMS. 2 TO 4 HOURS. Special problems or reading by arrangement with the faculty. Prerequisite: Consent of the instructor.

396. SENIOR DESIGN I. 4 HOURS. Same as Bioengineering 396, Energy Engineering 396, Information Engineering 396, and Materials Engineering 396. Introduction to engineering economics, legal and social constraints on design, safety and reliability theory, and the use of simulation and optimization techniques in the engineering design process. Prerequisites: Senior standing and completion of all core requirements in the College of Engineering.

397. SENIOR DESIGN II. 4 HOURS. Same as Bioengineering 397, Energy Engineering 397, Information Engineering 397, and Materials Engineering 397. Application of principles of engineering and engineering design methodology to the solution of a large-scale design problem. May be taken in any department, regardless of area of concentration. Prerequisite: SysE 396.

Courses for Graduate Students

411. SYSTEMS THEORY I. 4 HOURS. Linear systems theory: state equations formulation, transform methods, structural properties, stability, observability, and controllability. Linear stochastic systems. Prerequisites: SysE 316, 342.

412. SYSTEMS THEORY II. 4 HOURS. General systems theory: observability, controllability, and stability for systems described by nonlinear, partial, and differential-difference equations. Prerequisite: SysE 411.

413. DIFFERENTIAL GAMES AND APPLICATIONS. 4 HOURS. Differential game theory as applied to mathematical models of socioeconomic and urban type systems. Optimal strategies are obtained as functions of the state variables, and computer simulations are used to determine optimal trajectories. Prerequisite: SysE 372.

445. ADVANCED MODELING IN SOCIOTECHNOLOGICAL SYSTEMS. 4 HOURS. Detailed studies of strategies and tactics for analyzing and designing large-scale complex engineering systems. Student teams formulate and exercise analytic and predictive models of engineering systems and their interaction with their environments. Prerequisite: SysE 345.

450. APPLIED STOCHASTIC PROCESSES. 4 HOURS. The stochastic nature of queues, inventories, and engineering reliability. Comprehensive analysis of queuing systems, Markov chains, and inventory models; engineering analysis of reliability problems. Prerequisite: SysE 350.

451. DECISION THEORY. 4 HOURS. Introduction to the mathematical analysis of decision-making when the state of the world is uncertain but further information about it can be obtained by experimentation. Formal consideration of the decision maker's knowledge about the application; utility theory. Relation between Bayesian and traditional statistical decision theory. Prerequisite: SysE 350.

455. URBAN INFORMATION SYSTEMS. 4 HOURS. The fundamental informational bases of urban system and subsystem structure, operations, and decision and control; cybernetic urban models, functional aspects of information systems, and operational examples of formalized systems; design of specialized planning information systems, including the establishment and fulfillment of information requirements. Prerequisite: SysE 337.

460. THEORY OF TRANSPORTATION NETWORKS. 4 HOURS. Establishment of a mathematical basis for network flows and the relation of this basis to combinatorial analysis and graph theory. Static and dynamic maximal flows, multi-terminal flows, and multicommodity flows. Application of these techniques to such other problems as the trim problem, the warehousing problem, and the allocation-location problem. Prerequisites: SysE 337, 371, and 372.

471. MATHEMATICAL PROGRAMMING IN INDUSTRIAL SYSTEMS. 4 HOURS. Mathematical programming as applied to functional areas of business and industry; review of status of operations research in major industries. Prerequisites: SysE 371, 372.

472. STOCHASTIC OPTIMIZATION. 4 HOURS. Development of algorithms that optimize mathematical models involving random variables for coefficients and/or restrictions. Changes necessary in linear programming and dynamic programming methods that allow handling of stochastic problems. Effect of underlying stochastic processes on nature of solution. Prerequisites: SysE 350, 373.

495. INDIVIDUAL RESEARCH. 2 TO 4 HOURS. May be repeated for a maximum of 12 hours. Research on special problems not included in graduate thesis. Prerequisite: Consent of the instructor.

498. SEMINAR ON SYSTEMS ENGINEERING. 2 TO 4 HOURS. May be repeated for a maximum of 12 hours. Systematic treatment of special topics; emphasis on current research. Prerequisite: Consent of the instructor.

499. GRADUATE THESIS. 0 TO 16 HOURS. May be repeated. Thesis work under the supervision of a graduate adviser. Prerequisite: Consent of the adviser.

ADDITIONAL FACULTY OF THE GRADUATE COLLEGE

The following faculty hold graduate standing and teach in departments that presently offer graduate-level courses but not graduate degrees.

Gyan C. Agarwal, Professor of Systems Engineering
Rene Amon, Professor of Architecture
Jean H. Baer, Professor of Education
Deepak Bammi, Assistant Professor of Systems Engineering
Morris Barazani, Associate Professor of Art
Hale Bartlett, Associate Professor of Management
Bernard H. Baum, Professor of Management and Sociology
Bertram Berenson, Professor of Architecture
Nancy D. Berryman, Professor of Art
Tanis Bryan, Assistant Professor of Education
Felix Candela, Professor of Architecture
Patricia S. Charlier, Associate Professor of Education
Edwin Cohen, Professor of Accounting
Edward Colker, Professor of Art
Leonard J. Currie, Professor of Architecture
Edward L. Deam, Professor of Architecture
James H. Dee, Assistant Professor of Classics
Rheta DeVries, Associate Professor of Education
Matthew W. Dickie, Assistant Professor of Classics
Mary A. Divito, Assistant Professor of Physical Education for Women
Elliott Dudnik, Associate Professor of Architecture
Maurice Eash, Professor of Education
Donald L. Ehresmann, Associate Professor of History of Architecture and Art
Bert E. Elwert, Associate Professor of Management
Joseph Engel, Professor of Systems Engineering
Patricia L. Engle, Assistant Professor of Education
Dorinda Evans, Assistant Professor of History of Architecture and Art
Lawrence P. Feldman, Associate Professor of Marketing
Wayne Fredrick, Assistant Professor of Education
Elizabeth Gebhard, Associate Professor of Classics
Michael Gelick, Associate Professor of Architecture
Charles B. Genther, Professor of Architecture
Robert W. Gerstner, Professor of Structural Engineering (Architecture)
Dorothy F. Gillanders, Professor of Physical Education for Women
Dwora Gilula, Assistant Professor of Classics
Owen Gregory, Assistant Professor of Finance
Irvin L. Heckmann, Professor of Management
Helen M. Heitmann, Professor of Physical Education for Women
Grace S. Holt, Coordinator of the Black Studies Program
   and Professor of Speech
Jacob Hornik, Assistant Professor of Marketing
S. George Huneryager, Professor of Management
Martin Hurtig, Professor of Art
Emanuel Hurwitz, Jr., Associate Professor of Education
Joseph Jachna, Associate Professor of Art
Jerald Jackard, Associate Professor of Art
Thomas Jaeger, Associate Professor of Architecture

William M. Kaplan, Associate Professor of Music
Constance Kamii, Associate Professor of Education
Randolph C. Ketlinski, Assistant Professor of Physical Education for Men
Arshad M. Khan, Assistant Professor of Systems Engineering
Marian Kneer, Associate Professor of Physical Education for Women
Carol LaBranche, Assistant Professor of History of Architecture and Art
Carl M. Larson, Professor of Marketing
Edwin B. Levine, Professor of Classics
Thomas E. Linton, Professor of Education
Alfred Maurice, Professor of Art
George Megarefs, Professor of Structural Engineering (Architecture)
Julius Menacker, Associate Professor of Education
Floyd G. Miller, Assistant Professor of Systems Engineering
Ronald Miller, Associate Professor of Management
George Monroe, Associate Professor of Education
Suleman Moosa, Assistant Professor of Finance
Van Cleve Morris, Professor of Education
Keith Morrison, Associate Professor of Art
Helmer K. Myklebust, Professor of Education
Richard E. Norton, Associate Professor of Music
William O'Neill, Professor of Systems Engineering
Lawrence B. Oscai, Associate Professor of Physical Education for Men
Wilma Pesavento, Associate Professor of Physical Education for Women
Susanna W. Pflaum, Assistant Professor of Education
Daniel Powell, Associate Professor of Education
Thomas P. Sattler, Assistant Professor of Physical Education for Men
Donald G. Scherrer, Assistant Professor of Physical Education for Men
Mary Schlinger, Associate Professor of Marketing
David M. Sokol, Associate Professor of History of Architecture and Art
Alvin Star, Associate Professor of Marketing
William Sukel, Assistant Professor of Management
Harriet Talmage, Professor of Education
Gunther Tetz, Assistant Professor of Art
Philip Tiemann, Associate Professor of Education
William W. Tongue, Professor of Economics and Finance
Judith V. Torney, Associate Professor of Education
Theodore J. Tracy, Associate Professor of Classics
Nicholas J. Valenziano, Assistant Professor of Music
Phillip H. Vanslooten, Assistant Professor of Physical Education for Men
Herbert Walberg, Professor of Education
Edward W. Walbridge, Assistant Professor of Systems Engineering
Donald Warren, Associate Professor of Education
Victor B. Weber, Assistant Professor of Music
Robert W. Weigand, Professor of Marketing
Ward W. Weldon, Assistant Professor of Education
Carroll Westfall, Assistant Professor of History of Architecture and Art
Richard R. Whitaker, Jr., Professor of Architecture
Frederick P. Wiesinger, Professor of Structural Engineering (Architecture)
A. Richard Williams, Visiting Professor of Architecture
Joseph Wolfe, Assistant Professor of Management
Thomas P. Wright, Assistant Professor of Physical Education for Men
Edward Wynne, Associate Professor of Education

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